

How Drones Will Affect The Oil & Gas Industry

TRENDS THAT MAY INFLUENCE OUR WAY OF DOING BUSINESS

AUCSC
Appalachian Underground Corrosion Short Course



Drones are not uncommon in the area, but what is unusual about this one is the purpose.

“We’re flying a drone to get a visual inspection of the pipeline that crosses the bridge,” says Peoples Gas spokesperson Barry Kukovich.

Peoples Gas is experimenting with new technology to find methane gas leaks along the 14,000 miles of natural gas pipeline they have in this region, and bridges are a key target.

Pipes along bridges are particularly vulnerable to leaks because of bridge expansion and contraction during weather and even salt run-off in winter



- **How Drones Will Affect The Oil & Gas Industry**

Unmanned Aerial Vehicle (UAV's) or Drones are increasingly being used by the Oil & Gas industry for their monitoring and inspection operations. With the use of drones becoming increasingly popular over traditional methods – dangling over ropes and wire - is it time to finally abandon these roles and instead adopt drones to take care of both on-shore and off-shore inspections?

Overview

- Background – What is a Drone?
- Technology and Applications
- Challenges
- The Future
- Q & A



What is a Drone?

Many names

- Unmanned Aerial Vehicle (UAV)
- Unmanned Aerial System (UAS)
- Remotely Piloted Vehicle (RPV)
- Remotely Operated Aerial Vehicle (ROAV)

Many sizes

- Micro-Drones
- Prosumer Drones
- Commercial Drones
- Military Drones



Background

- Rapidly developing industry
 - Estimated \$90B market
 - 100K jobs in next 10 years
- Highly regulated... for good reason



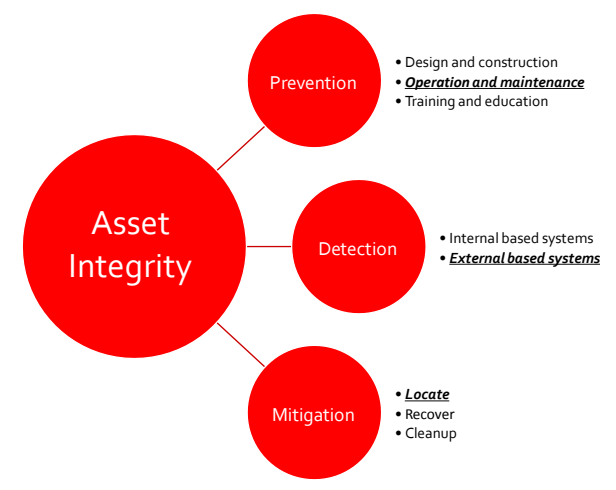
FAA Regulations

- Commercial use of drones illegal UNLESS:
 - Granted a "Section 333" exemption
 - Received a Certificate of Authorization (COA) for each flight
 - Operated by a pilot with an FAA issued airman certificate
 - Pilot's license is a requirement, currently no specific UAV training
 - Operated by a two man team
 - Pilot in command (PIC)
 - Visual observer (VO)
 - Less than 400' AGL
 - Within visual line of sight of PIC



Technology and Applications

Every operator's goal is improved safety with increased savings...



Technology and Applications

- Pipeline Patrol
 - Image analysis
 - Threat detection
 - Gas leak detection
- Cathodic Protection
- Vertical Structure Inspection
- Offshore Inspections
- Mapping
- Data Analytics



Pipeline Patrol – Image Analysis

- Vegetation health
- Soil erosion
- Encroachments
- Deviations from reference
- “Threats”





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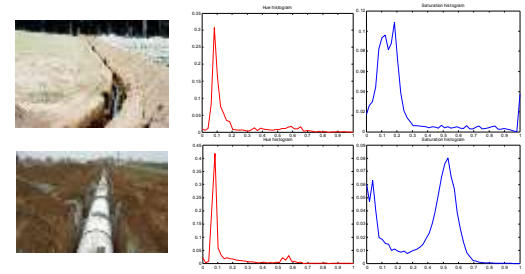
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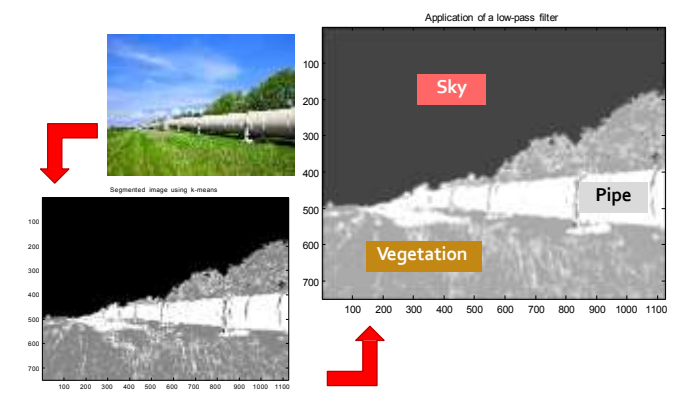
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Gas Detection

- Diff Absorption Laser
- IR Cameras



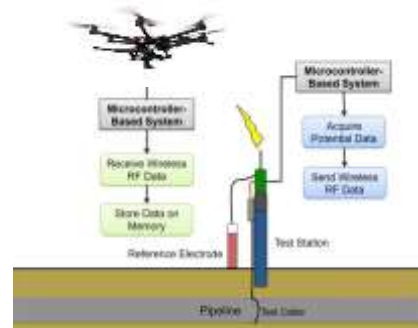
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Cathodic Protection Data Collection

- Wireless transmission processing unit
- Recorded pipe-to-soil voltage readings



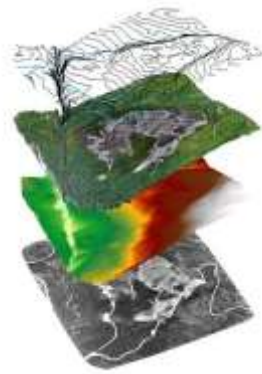
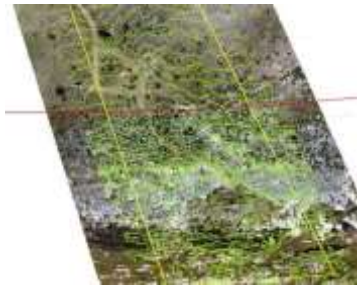
Structure Inspection

- Visual Inspection
- 3D digitizing
- Orthomosaics
- Identify hot spots
- Measurement accuracy



Mapping & Modeling

- 3D, 2D
- Topographic
- Spill Modeling



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- 3D, 2D
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Current Challenges



Flight Time, Payload, and Distance

- Flight Time
 - Battery Powered – 10-18 minutes
 - Gas Powered – 2 Hours +
- Payload
 - Multirotor – 15 lbs
 - Fixed Wing – 5 lbs
 - Hybrid Multirotor – 20 lbs
- Distance
 - FAA regulations
 - Line of Sight Communications

Data Analytics

- Why Big Data?
 - Information from traditional sources
 - Information from new sources
 - Increased frequency
- Applications
 - Equipment maintenance
 - Production optimization
 - Safety and compliance
- Volumes of data increasing by a factor of 5 each year¹
- Highest big data priorities²:
 - Develop near real time analytics – 62%
 - Expand data storage – 58%
 - Analyze increasing unstructured data – 53%
- Expected challenges to big data²
 - Managing data growth – 49%
 - Integrating disparate business tools – 41%

1. Brown, Brad, Jacques Bughin, Angela Hung Byers, Michael Chui, Richard Dobbe, and James Manyika. "Big Data: The Next Frontier for Innovation, Competition, and Productivity." McKinsey Global Institute, McKinsey & Co. May 2011.

2. Microsoft. "Global Enterprise Big Data Trends: 2013." September 2012.

Data Analytics

- Apply predictive analytics to big data
- Empirical methods of data mining also used to avoid conditions where pipeline corrosion accelerates
- Real time data leading to prediction provide environment to increase support for safety
- Case Study - One meter, four variables
 - Pressure differential
 - Energy rate
 - Flow rate
 - Static pressure
- 100% on medium alert signals
- 57% on high alert signals
 - 100% precision



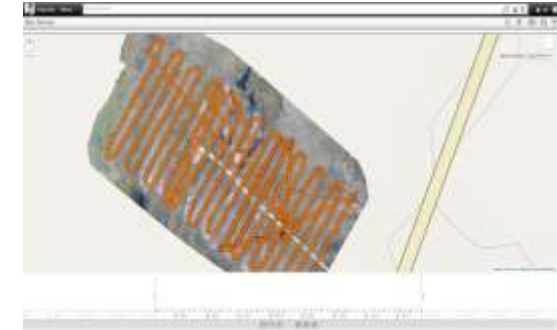
Data Analytics

- Business Intelligence
 - Use tools to find, select, and explore data in flexible ways
- Data storage and management
 - Capture and enable analysis of data
 - Server or cloud-based



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Summary

TODAY

- Patrol
- Vertical structure and facilities inspections
- Gas detection
- Video imaging
- Mapping
- Pre-construction survey
- Phase 1 environmental survey

• TOMORROW

- Data analysis platform
 - Searchable user interface
 - Map-based
 - Timeline oriented
- Automated image analysis and threat detection
 - Class location
 - HCAs
- CP data collection

QUESTIONS?