DRONE INSPECTIONS AND ISSUES
BACKGROUND

ISW WAS FORMED IN 2014 TO DEVELOP SOLUTIONS FOR THE COMMERCIAL ROOFING INDUSTRY. CURRENTLY ONE OF THE LARGEST DRONE COMPANIES IN CANADA.

DRONE=RPAS=UAV=UAS
THERMAL ROOF SCANS

- Problems we identified:
  - Dangerous
  - Incomplete
  - Slow
THERMAL ROOF SCANS
TRADITIONAL METHOD

- Team of at least 2 people
- Hand held thermal camera
- Night time work due to thermal differential
- Wet insulation holds heat longer than dry insulation.
- Cooling of air allows the subsurface moisture to become visible.
- The surface of the roof is dry while underneath the roof has moisture penetration
THERMAL ROOF SCANS

OUR DRONE SOLUTION

- Drone based thermal camera
- RGB and Thermal map of the entire roof (through othomosiacs)
- Fast
- Safe crew remain on the ground.
HOW DOES IT WORK?

• The drone flies in a predetermined path over the roof. Taking images every 2-3 meters.
• Hundreds of individual photos or thermal images are gathered.
• On landing these images are transferred to a computer.
• Software is used to stitch all these images together to create one single thermal map.
RESULT
COMPARISON

GROUND BASED

Single photos with no spatial awareness.

DRONE

Thermal map of entire roof structure. 3.8 million sq./ft

Wet insulation holds moisture and heat longer than dry air.
ADVANTAGES

• Drone 95% faster on larger buildings 3.9 Million sq. ft scanned in 4 hours. Compared to 3-4 weeks.
• Safer no one required on the roof. Insurance and liability issues reduced.
• Everything done in one environmental window. Better more consistent data.
• Complete coverage.
• Mapped building that is measurable.
• Anomalies can be measured and area found.
DISADVANTAGES

- Still requires secondary verification (as does ground based)
- Regulations can still be an issue.
- Mass of amount of data produced.
WHAT WE LEARNED

- Drones produce a lot of data
- You need a way to manage that data
- Othomosiacs do not work for every situation
- Resolution is king

Where are the top 2 images taken?
DRONES WE USE

Industrial specific drones
Dual payload, RGB and Thermal
Aeryon Skyranger (Canada)
Intel/Astec Falcon (Germany)
Flyability Elios (Swiss)
Limited use of DJI Drones.
CHINA QUESTION

- Is your data safe from foreign powers?
- Where is your data stored?
- What information privacy rules exist in other countries?

- DJI is the world leader in drones. They make some of the best drones in the world.
- Flight plans, location and some images get uploaded to servers.
- DJI say this can be turned off.
- Some companies question this. Although DJI have made active strides to assure people there data is safe.
ENERGY SECTOR

- Flare stack inspections
- Chimney inspections
- Tank inspections
- Interior inspections
GREAT SOLUTION

BUT HOW TO IDENTIFY EACH PIPE ON VIDEO
TANK/PIPE INTERIOR INSPECTIONS

- Drone inspection ideal to replace human inspection
- 8 minutes of flight (4 out 4 back)
- Range dependent on signal strength
- Visual and thermal data gathered
- 15 inch Hole required
- Currently video only (no photogrammetry)
- Not intrinsically safe
- Future systems will allow mapping.
AFTER THE FLIGHT
DATA AND HOW TO HANDLE IT

TYPICAL INSPECTION RESULTS IN HUNDREDS (OR THOUSANDS) OF PHOTOGRAPHS.

MANY PHOTOGRAPHS ARE HOMOGENEOUS IN NATURE.

CAUSES CONFUSION AND RUINS WEEKENDS
BLUE VU

- Software specifically designed for inspections.
- Uses a 3D model created from Drone photographs.
- GPS preferred but not required.
- Users can mark up photos in 3D space.
- Automatically generate reports.
AUTOMATIC REPORT GENERATION

- All anomalies displayed in a comprehensive report
- All fields and Logos customizable
- Summary pages
- Detailed Photographs
- Comments and Executive Summary
• Artificial Intelligence Based Detection of Anomalies
  • Advantages:
  • Minimal human intervention to keep human and time cost low
  • Data driven solution
  • Coarse and fine level anomaly detection
  • Quicker analysis of hundreds of images as compared to in person
  • Continuous evolution of higher accuracy in detection
  • Easily deployable and trainable as per customer scenario
Current state - Corrosion detection

Input Image

Corrosion detection
Current state - Crack detection
Drone images  
Processing (3D model build)  
AI Active Learning  
Automatic annotation of anomalies  
BlueVu Output

BUILDING BLOCKS FOR FUTURE DRONE INSPECTION PROCESS