MEASURING LOG DECKS WITH SMALL UNMANNED AERIAL SYSTEM (SUAS)

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USER EXPERIENCE AND LESSONS LEARNED SO FAR....

• Terminology
• Need for alternative measurement technique
• “Drone” selection
• Flight Planning
• Data Processing
• Data Deliverables
• Next Steps
• Other Beneficial Applications
• Limitations
• Regulations
• Q&A
TERMINOLOGY – “DRONE”

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  1. a stingless male bee (as of the honeybee) that has the role of mating with the queen and does not gather nectar or pollen
TERMINOLOGY

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  2. one that lives on the labors of others: **PARASITE**
  3. an unmanned aircraft or ship guided by remote control or onboard computers
TERMINOLOGY

Alternative synonyms for “DRONE”

• UAV – Unmanned Aerial Vehicle
• sUAS – Small Unmanned Aerial System (Under 55 pounds)
• “Micro” UAS – Unmanned Aerial System (4.4 pounds or less) June 2016? TBD
LOG YARD INVENTORY – CHILCO, IDAHO

In 2013 our Mills were acquired in 2013.
In our Mills log yard inventory has been managed since 2013.
Log yard inventory - Chilco, Idaho

Integrity Log Yard

In our Mills

Installed in 2013

Traditional methods of

Inventory has been

Testing since

Testing with 3rd

Flying quadcopter

Producing models in
In our Mills in 2013, we began testing with 3rd party flying quadcopter producing models in AIA regulations. We are still working to acquire exemption from
LOG YARD INVENTORY – CHILCO, IDAHO

Our Log Yard Gantry was implemented in our Mills in 2013.

Traditional methods of logging yard inventory have been modernized since then by testing with 3rd party flying quadcopter technology in producing models in revised FAA regulations..... and we continued to work to acquire an exemption from 333 regulations.

October 2023.
WHAT sUAS TO UTILIZE?

Quadcopter vs. Fixed Wing

Major Factors Considered:
- Safety
- Proven track record
- Flight Time per battery
- All inclusive SYSTEM
- Takeoff and Landing requirements

Fixed Wing Advantages
- Longer flight times
- Safer
- Lighter weight

Quadcopter Advantages
- Take off and land in small areas
- Ability to fly slow
- Gimbal and Video Capabilities
OUR (sUAS) SMALL UNMANNED AERIAL SYSTEM
EBEE BY SENSFLY

Weight = 1.52 pounds
Wingspan = 38 inches
Max flight time = 50 minutes
Cruise Speed = 25-56 MPH
Can fly in up to 28 mph wind
Horizontal Accuracy 1.2 inches
Vertical Accuracy 2.0 inches
OUR (sUAS) SMALL UNMANNED AERIAL SYSTEM
FLIGHT PLANNING & CONTROL

Software = eMotion
- Flight Planning
- Flight Monitoring
- Update Missions during flight
- Hazard avoidance
- Post processing of images
OUR (sUAS) SMALL UNMANNED AERIAL SYSTEM POST FLIGHT DATA PROCESSING

Software = Post Flight Terra 3D
• Process Imagery
• Incorporate Ground Control Points (GCP)
• Create Point Cloud
• Create Orthomosaic
• Export data files
  • Image file
  • Point Cloud
  • Digital Surface Model (DSM)
  • Digital Terrain Model (DTM)
  • Google Earth File
  • Coordinate System
FIRST THINGS FIRST

Establish ground control point (GCP) network

Traditional Survey GCP’s and ground elevations in desired coordinate system
LOG YARD INVENTORY – GROUND CONTROL POINTS

What are they?
• Known coordinates onsite; Northing, Easting, Elevation
• Need at least 4 per flight

Why do we need them?
• Makes it so dataset models are in the same space every time
• Increases absolute accuracy

Where should you put them?
• Checker boarded across areas of future interest
• In areas that remain clear
• More is better
LOG YARD INVENTORY – GROUND CONTROL POINTS
LOG YARD INVENTORY – FLIGHT PLANNING

Weather
• No precipitation
• Wind below 28 mph

Lighting
• Overcast is the best light
• High noon best if no clouds are present

Hazards
• Low flying aircraft
• Birds of Prey

Preflight Checklist
• 25+/- items
LOG YARD INVENTORY – POST PROCESSING

- Geotag images
- Initial rapid processing
- GCP allocation
- Full dataset processing
- Point Cloud Editing
- Orthomosaic Editing
- Export Data
LOG YARD INVENTORY – EXPORT

- Pick Coordinate System
- DSM geo tiff
- .las
- .dxf
- .kml
LOG YARD INVENTORY – NEXT STEPS

Continue to validate data accuracy

Incorporate into our GIS system

Automate work flow

Run trials on different point cloud densities

Run trials on different image resolution / flight elevations
OTHER BENEFICIAL APPLICATIONS

Volume estimates
• Hog fuel
• Log yard debris
• Rock pit

Irrigation Coverage

Base mapping
MAJOR LIMITATIONS

Surface uniformity = BAD Data

Tall Grass, Shrubs, Trees.... Limit accuracy

Weather

You can only measure what you can see
REGULATIONS - KNOW BEFORE YOU GO

Federal Aviation Administration (FAA) 333 Exemption

Aircraft Registration

Certificate of Waiver or Authorization (COA)

Notice to Airman (NOTAM)

Check local jurisdictions as well
QUESTIONS?