# Stockpile Volume Calculation

*Country*: Kentucky, USA  
*Job Type*: Volume Calculation  
*Project Date*: February 2017  
*Project Size*: 13,200 m² (3.3 acres)  
*Drone*: Phantom 4 Pro  
*Pattern of Flight*: Oblique  
*Number of Images*: 45  
*Accuracy*: 2.5% volume difference without GCPs  

**DatuSurvey™ Savings**  
- **0.5 field** hour instead of 1.5 hours using conventional methods  
- **1 office** hour  
- No need to climb the pile
Project Description

High precision volume calculation of the stockpile that needs to be accomplished in a short time without using Ground Control Points in a safe and automatic process.

Data Acquisition

Acquiring Images

Data was collected with a DJI Phantom 4 Pro drone using a 20 MP camera.

Mission was planned with flight planner app DatuFly™, allowing quick, precise and automatic image capturing.

Flight duration was 6 minutes at an altitude of 132 ft. (40m).

Resolution was 2.4cm/pixel.

Geo-Referencing

4 Ground Control Points in the area of the project were surveyed by RTK GPS.

The first project of volume calculation was geo-referenced with the GeoTag option utilizing only the GPS data embedded in the EXIF of the image.

The second project of volume calculation was geo-referenced using Ground Control Points.
Conventional Survey

The area of the stockpile was surveyed by using the conventional method with RTK GPS. The data includes 173 points describing the surface of the pile.

This data was used for comparison.

Achieved Results

The project is processed in less than an hour, including dense point cloud with mesh and texture and volume calculation reports.

The difference between volume without GCP and with GCP is 2.5%.

The difference between volume with the conventional method and volume without GCP is 4.5%, while there are 8,566 points describing the surface compared to 173 points of conventional survey.

Scale accuracy can also be checked by measuring the distance between the car wheels.

The distance measured in the project without GCP points differs from the actual size by 2 cm (0.06 ft.)

The distance measured in the project with GCP points differs from the actual size by 0.66 cm (0.002 ft.)
DatuSurvey™ Enterprise Outputs

Texturized Dense Point Cloud

Dense Point Cloud with the Surface for Volume Calculation
Surface for Volume Calculation

Conventional Topo Survey
Surface from DatuSurvey™ via Imported Conventional Topo Survey

Yellow TIN – DatuSurvey surface

Green TIN – conventional survey
# DatuSurvey™ Enterprise Volume Calculation Report

<table>
<thead>
<tr>
<th>Job Name:</th>
<th>Stock_pile_volume</th>
</tr>
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<tbody>
<tr>
<td>Organization Name:</td>
<td></td>
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<tr>
<td>Creation Date:</td>
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<tr>
<td>Measurement Unit</td>
<td>[Meter³]</td>
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</tbody>
</table>

### Volume Name: pile_gcp_2
- **Surface Name**: pile_gcp
- **Base Surface Name**: pile_gcp
- **Calculation Date & Time**: 10/03/2017 2:47 PM
- **Fill**: 42566.701
- **Cut**: 11.523

### Volume Name: Pile_NOgcp_2
- **Surface Name**: Pile_NOgcp
- **Base Surface Name**: Pile_NOgcp
- **Calculation Date & Time**: 10/03/2017 2:56 PM
- **Fill**: 41523.407
- **Cut**: 30.701
Orthophoto

True Orthophoto was generated from the oblique flight.
Objects Elimination

An additional project was made with a car on the top of the pile. In order to eliminate the car from the volume calculation it’s simply not included in the polygon of interest:

Texturized Dense Point Cloud with a Car on Top

Surface for Volume Calculation
DatuSurvey™ Enterprise Benefits

- AUTOMATED, INTUITIVE & SIMPLE
  - User interface that follows surveyor work process

- PROFESSIONAL, SURVEY GRADE
  - High Precision & reliability

- STAY SAFE
  - Employ aerial and ground images

- SAVE TIME & CUT COSTS
  - Save up to 30% office time

- MONETIZE YOUR BUSINESS
  - Manage more projects, grow your business

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