Topographical Survey and Volumetric calculations of open pit mine by TAS Mapper Series UAS

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"Art of Acceleration"

Overview

Using TAS Mapper Series Unmanned Aerial Systems to do topographical survey , measurements and extraction of volume in an open pit mine.

Objectives

1. Topographic surveys of quarries

2. Elevation and volumetric calculation.

3. Measurement of roads and other features extraction.

Deliverables

1. High resolution orthomosaic.

2. Point cloud data in LAS format.

3. Stockpile volume calculations.

4. Detailed topographic survey in AutoCAD /ArcGIS formats.

5. Detailed contour model in dbf formats.

6. 3D model in Illustrator pdf formats.

1 Quarry volume extraction by using TAS mapper series of UAS

Quarries are areas of high risk and hence take a lot of human effort to measure volume. Quarry owners can use UAS to monitor features of their quarry and measure parameters such as area, volume, etc. Bird take close-up images of the quarry surface. Aerial data can be used to render orthomosaic image. With the help of an orthomosaic image, volume extraction can be measured. Customers can easily measure the parameters without visiting the quarry.

1.1 Project Workflow

Figure 1: Processing Steps
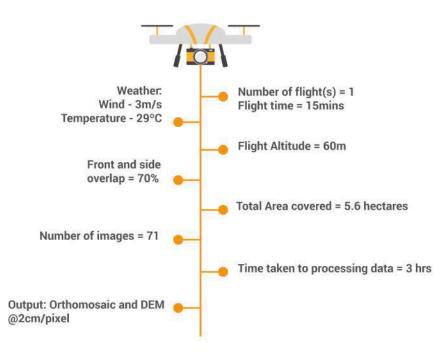
2   Flight Parameters

Figure 2: Summary

Figure 3: Flight plan

Figure 4: Captured geotagged images

3   Processed image and comparisons

(a) UAS images.

(b) Satellite images.

Figure 5: Comparison between UAS images with the Satellite images.
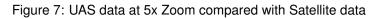
(a) UAS image.

(b) Satellite image.

Figure 6: UAS data at 2x Zoom compared with Satellite data

(a) UAS image.

(b) Satellite image.

Figure 7: UAS data at 5x Zoom compared with Satellite data

4   Parameters measurements

With the help of processed data, we measured the volumetric of stagnated water and width of the access road and haul road.
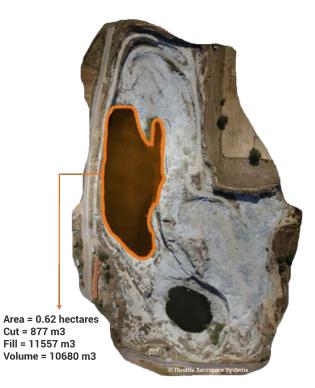

Area = 0.62 hectares
Cut = 877 m3
Fill = 11557 m3
Volume = 10680 m3

Figure 8: Volume measurements

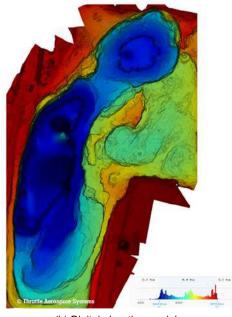(a)   (b)

Figure 9: Width measurements

5 Creating Orthomosaic image and Digital Elevation Model (DEM)

We created Orthomosaic and DEM with the help of Geo-tagged images. This helped to visualize details about the mapped area.

(a) Orthomosaic image (b) Digital elevation model

Figure 10

Results

1. Faster turn around.

2. Increased accuracies.

3. Increased safety.