What value drones bring to construction industries over traditional methods?

Throttle Aerospace Systems Pvt Ltd

"Art of Acceleration"

Overview

TAS Mapper Series UAS can be used to perform an aerial topographical survey, measurements, feasibility studies on construction site.

Objectives

1. To perform a topographical land survey of renovation school construction site.
2. Evaluation of Digital Elevation Model
3. Extraction of features like access road, back road and open area etc.

Deliverables

1. High resolution orthomosaic image and DEM
2. Point cloud data in LAS format
3. Stockpile volume calculations
4. Detail topographic survey in AutoCad/ArcGIS format
5. Detail contour model in dbf formats
6. 3D Model in Illustrator pdf formats

1 Topographic land survey of a construction site

Figure 1: Processing Steps

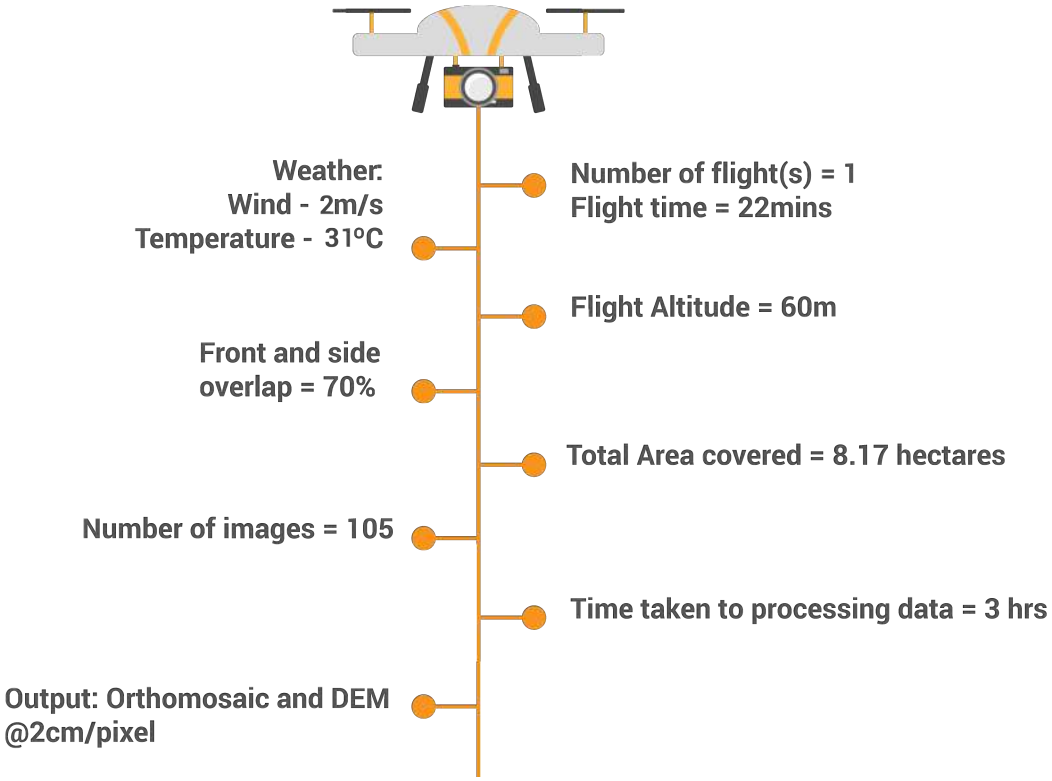


Figure 2: Summary

Figure 3: GCPs Marked Area

2 Processed Image and Comparisons

(a) UAS Image (b) Satellite Image

Figure 4: Comparison of UAS Image with Satellite Image

(a) UAS Image (b) Satellite Image

Figure 5: UAS data at 2x Zoom compared with satellite data

(a) UAS Image (b) Satellite Image

Figure 6: UAS data at 4x Zoom compared with satellite data

3 Parameter Measurements

With the help of processed data, we measured the width of the access road and the back road.

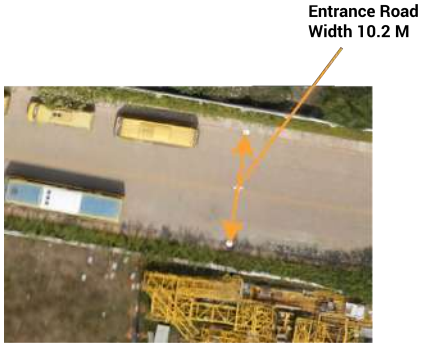


Figure 7: Entrance Road width

Figure 8: Back access road width

4 Area and Distance Measurement of the constructed building

Using processed data, we measured the dimensions and calculated the area of the constructed building and also measured the volume of pit.

4.1 Area and length measurement

(a) Area Measurements

(b) Length Measurement

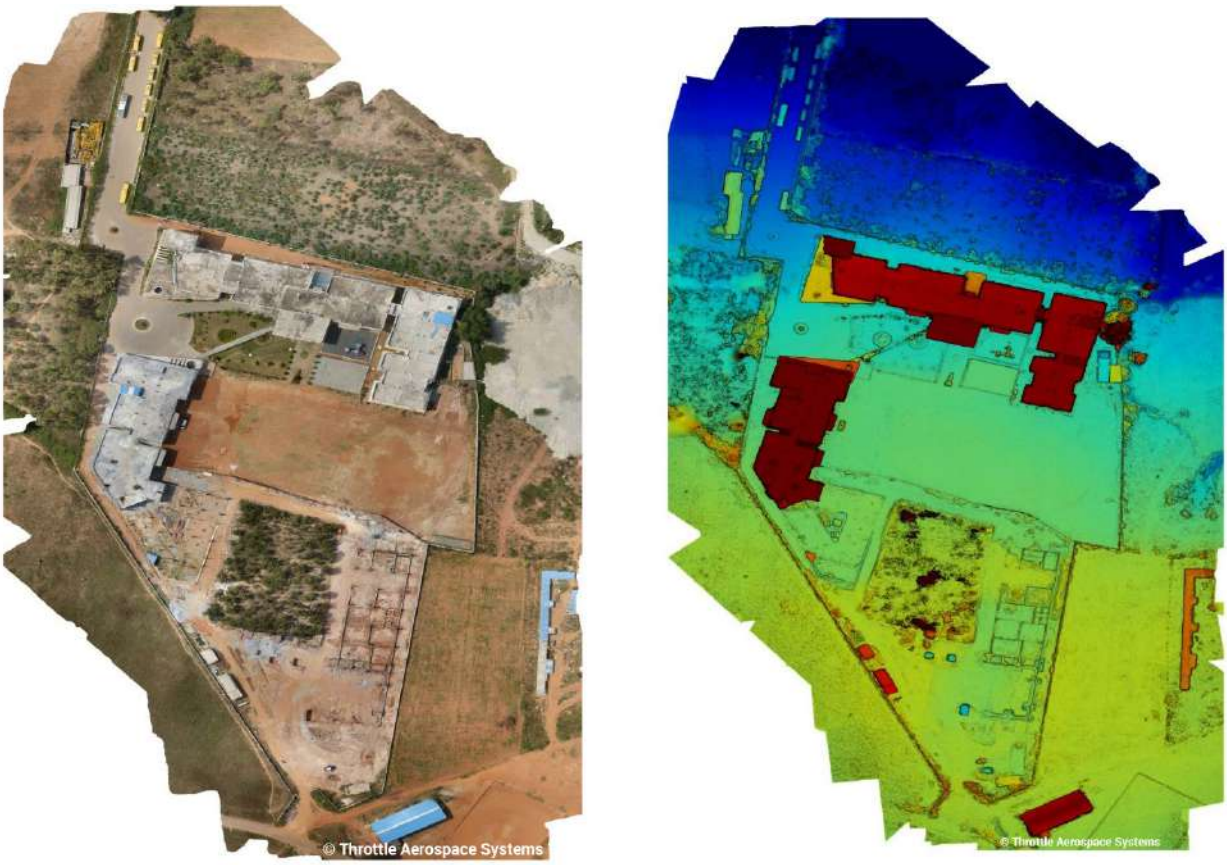
Figure 9: Area and length measurement of the constructed building using TAS UAS

4.2 Construction area pit volumetric measurement

Figure 10: Pit volumetric measurement

5 Creating Orthomosaic image and Digital Elevation Model

We created an orthomosaic image and a DEM with the help of Geotagged images. This helped us to visualize in detail, the mapped area.



(a) Orthomosaic Image (b) DEM Model

Figure 11: Orthomosaic and DEM images

6 Relative Accuracy

Check Point Name	Accuracy XY/Z [m]	Error X [m]	Error Y [m]	Error Z [m]	Projection Error [pixel]	Verified/Marked
GPS1A	0.0200/0.0200	-0.0342	-0.0275	-0.1074	0.7492	5 / 5
GPS3A	0.0200/0.0200	0.0015	0.0209	-0.0083	1.7625	5 / 5
Mean [m]		-0.016349	-0.003305	-0.057826		
Sigma [m]		0.017805	0.024156	0.049566		
RMS Error [m]		0.024172	0.024381	0.076162		

Figure 12: Accuracy Chart

7 Obtain 3D Image

Figure 13: 3D Image of the Construction Area

8 Results

1. Faster Turn around
2. Increased accuracies
3. Increased safety.