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HIGH RESOLUTION 3D PIT MODELLING

Arvista and Entech are pleased to offer a high-resolution 3D modelling service for open pit mines. The models are generated from numerous low-level, oblique images captured with Arvista's professional unmanned aerial vehicle (UAV) systems. This method of modelling provides a safe, rapid means of accurately modelling all parts of an excavation which may not be feasible by other means such as laser scanning or terrestrial photogrammetry.

Arvista provides a range of surveying services to the mining industry, including aerial surveying and traditional open pit & underground mine surveying. We are a leading provider of unmanned aerial vehicle (UAV) surveying services, having conducted monthly volumetric surveys (of stockpiles, pits, TSF's), and larger area topographic surveys of mine sites and tenements since 2012.

Entech is an international mining consultant specialising in Mining Engineering, Ventilation, Geotechnical and Geological services.

THE BENEFITS

Our pit modelling service provides the following benefits:

- By using UAV, it is possible to access areas within a pit that may not be possible to model by other means.
- The highly detailed, rendered models provide a significantly greater level of detail than could otherwise be obtained.
- The model can be provided in numerous formats, enabling a range of analyses to be conducted by offsite personnel such as geological and geotechnical professionals.
- The high level of spatial accuracy enables the model to be used for mapping of features which can then be utilised in geological and geotechnical modelling
- Minimises requirement for personnel to enter the pit, enabling detailed modelling and mapping of hazardous areas (such as large pit slips and tension cracking) and minimises the interaction of personnel and mobile plant within an operating pit.

METHODOLOGY

We utilise the latest in professional multi-rotor UAV and survey-grade GNSS systems for the image acquisition, enabling us to achieve spatial accuracies that are required for detailed pit mapping.

Arvista's team of certified UAV operators have significant mine surveying experience and are able to arrive at your site fully equipped to conduct the pit survey on a self-sufficient basis.

All necessary data processing is conducted by Arvista, enabling completed models to be delivered in a timely manner.

TYPICAL USES FOR THE 3D MODEL

The pit modelling has multiple uses, including:

- Mapping/digitisation of structures/domains/features of geotechnical significance in pit walls for assessment of proposed excavations,
- Detailed assessment/back-analysis of pit wall failures
- Remote observation and tracking of progressive wall failures
- Reconciliation of asbuilts against design
- Geological mapping and digitisation of lithological contacts/faults/weathering profiles etc.
- Obtaining up-to-date asbuilts of historic pits for mine planning purposes.
- An effective means of communicating pit conditions or proposed excavations to employees, consultants, regulators



A cross-section of a modelled open pit in OBJ format compared with a cutback design (shown in Surpac 6.8 software):

USING THE DATA

The 3D model can be provided in a range of formats to suit your software. Common file formats include:

- Wavefront OBJ – a rendered 3D model that is supported by many mining software packages such as Surpac (version 6.8 onward), Maptek i-Site Studio, Leapfrog, GEM4D, and others.

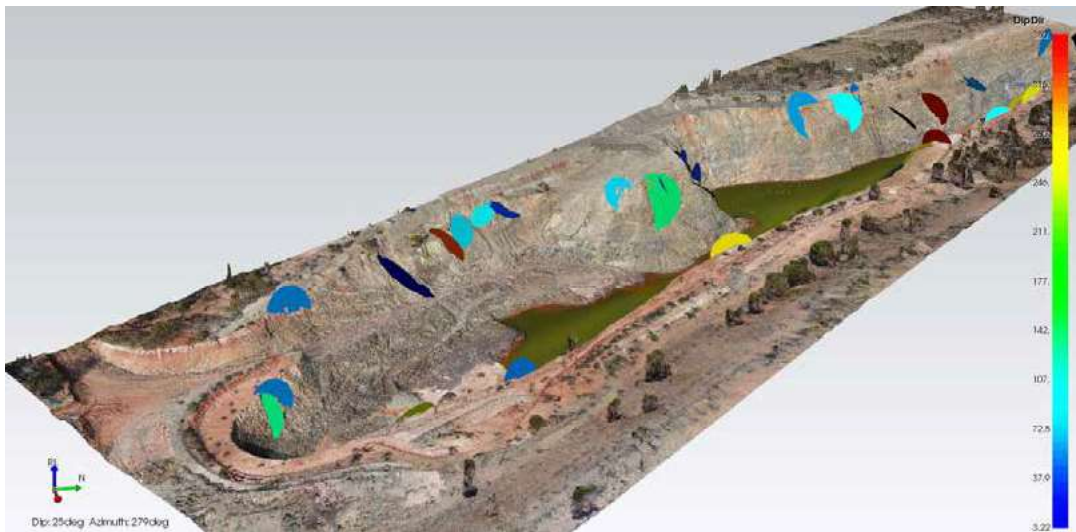
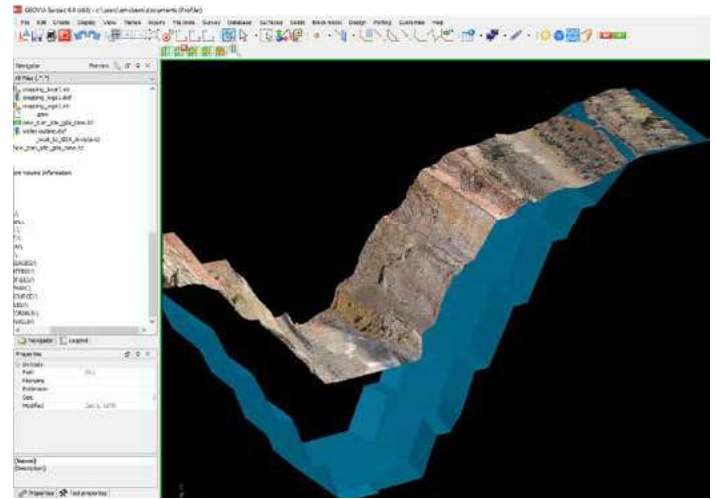
- Surpac DTM
- Vulcan .00t
- DXF
- Point clouds

Other file formats can be provided on request.

ADDING VALUE TO YOUR DATA

Entech can provide clients with additional services such as the development of geotechnical structure models within a pit, geotechnical assessment of proposed excavations such as cutbacks, back-analysis of slope failures, review of pit wall performance to name a few. The mapping data can be provided in a range of formats to enable use in other software (such as DIPS, 3D structure files/wireframes, CSV structure files)

Examples of pit models with mapped structures which can be exported as DXF surfaces, or in CSV format with XYZ, dip, dip direction and persistence etc.





3D model of an open pit shown in Surpac 6.8 software

CONTACT DETAILS

EVAN MCKERN

Arvista – Manager

M: 0419 962 466 | **P:** (08) 6189 1800

E: evan.mckern@arvista.com.au

Arvista Pty Ltd

8 Cook St, West Perth WA 6005

www.arvista.com.au

TOM PARROTT

Entech – Principal Geotechnical Engineer

M: 0407 306 787 | **P:** (08) 6189 1800

E: tom.parrott@entechmining.com.au

Entech Pty Ltd

8 Cook St, West Perth WA 6005

www.entechmining.com.au