

### **Tests to determine the suitability of AgiSoft PhotoScan for archaeological recording**

**A Meerstone Archaeological Consultancy White Paper: July 2010**

**Product website** <http://www.agisoft.ru/products/photoscan/>

**Overview**

As part of our development of Meerstone Archaeological Consultancy and the services that we offer we are writing a series of white papers to share our experiences of testing new approaches and techniques. As part of our commitment to ethical archaeology and making high quality archaeology accessible to all we are particularly interested in open source and freeware solutions. This is our second white paper which reviews our tests of AgiSoft PhotoScan.

"AgiSoft PhotoScan is an advanced image-based 3D modeling solution for creating professional quality 3D content from still images. Based on the latest multi-view 3D reconstruction technology, it operates on arbitrary images and is efficient in both controlled and uncontrolled conditions. The photos can be taken from any positions, providing that an object to be reconstructed is visible on at least two photos. Both image alignment and 3D model reconstruction is fully automated.

Supported input formats: JPEG, TIFF, PNG, BMP, JPEG Multi-Picture Format (MPO). Supported output formats: Wavefront OBJ, 3DS Max, PLY, VRML, COLLADA, Universal 3D, PDF"

Taken from the AgiSoft website July 2010.

This software takes multiple digital photographs and automatically creates a 3d model. This process is identical to that described for AgiSoft StereoScan in an earlier [white paper](#) .

An evaluation version of AgiSoft PhotoScan with file saving disabled has been tested using two

different types of image. Firstly aerial views captured using kite aerial photography (KAP). Secondly photographs of architectural details taken using a hand held camera.

### **KAP images**

The KAP images were chosen with care to represent overlapping images. These photographs were all taken with a Canon DIGITAL IXUS 860 IS 8mp camera under different lighting conditions.

Experimentation demonstrated that processing time depends on two variables. The first is the number of photographs. This was to be expected, more photographs means more point matching therefore more processing time. The second variable was the density of images. Having a high number of photographs overlapping significantly increased processing time. For 20 images it can take up to 30 minutes to produce the model. The key is to carefully select images so that the overlap is sufficient to produce a competent model, but not so much that it increases processing time. Unlike the free AgiSoft StereoScan, PhotoScan, given suitable images produces good clean models with few holes in the data. Tricky images containing building fragments came out better due to an increased number of viewpoints provided by using multiple photographs.

Below are sample images of models.

Video of test 1 An 18th/19th century lead mining landscape photographed in even lighting

{vimeo}13541677{/vimeo}

This model has produced a good representation of a complex landscape that includes complex earthworks and large areas of mineral spoil.

Video of test 2 An area of complex earthworks photographed with low evening sun {vimeo}13541884{/vimeo}

This model show that even with strong, low angle, directional light can produce a competent model. Some detail is lost in the shadows but that is made up for by the visibility of slight

variation that would not show on more evenly lit images.

### Architectural detail

The ground level photographs of architectural detail included ornate carvings, incised text and monumental inscriptions on grave stones. The photographs were taken with a hand held Canon DIGITAL IXUS 860 IS 8mp camera. The distance to the objects was around 1m. Processing was again very quick but the results varied and the result of using more than two images was, as expected, a much enhanced model.

Video of test 3 18th century lead miners meerstone, Grassington Moor

{vimeo}13543215{/vimeo}

Created from just 3 photographs this model demonstrates how well the software is able to capture and enhance the detail on carved stone.

### Comments

These tests have confirmed that this software is a useful tool that demonstrates the value of 3d modelling from photographs. The results were a significant improvement on the free AgiSoft StereoScan, although that is certainly still a very useful package.

AgiSoft PhotoScan coupled with kite aerial photography is a capable tool able to produce models suitable for site monitoring, for publications, or for museum virtual displays. The ability to rotate the image and the added 3d feel adds a considerable level of usefulness to aerial photographs, although as we were unable to save files to further test them in other software to assess their suitability for landscapes mapping.

Using the software for recording architectural detail, carving and graffiti partly depends on how the photographs are taken, but it does look like hand held photography with at least 3 images will produce satisfactory results. Further tests are needed using different lighting options. This is an application that benefited considerably from using software able to use more than two images.

As with AgiSoft StereoScan the software is easy to install and simple to use and appears robust. The ability to export in a range of recognised file types including pdf is very useful and allows the models to be either distributed as is or to be fine tuned in other modelling packages.

Written by Martin Roe © July 2010

