SCANNING THE
HORIZONS
A Newsletter on Leading Edge Spatial Technologies

## African Issue



# Introducing SiteSee to Africa

SiteSee™ is a powerful visualisation tool introduced to Africa by AOC (part of the AAMHatch Group). SiteSee is quickly becoming the standard for mining and engineering sites around Africa and the world.

The 360º views generated by SiteSee enable users to visualise any features as if they were actually there. It has proven to be a safe method of visualising hazardous areas and an efficient way of 'walking through' a remote site.

The process commences with AOC collecting a series of stationary spherical images. Numerous overlapping photographs are acquired and then stitched together using feature matching algorithms, similar to those found in aerial photogrammetric software packages. The resulting images are colour-balanced to produce finished spherical products that are seamless.

Teams viewing SiteSee can be based anywhere in the world. Various viewing platforms, including web-enabled viewers, increase the flexibility and accessibility of these visualisation datasets. SiteSee enables virtual walkthroughs of the plant by hyper-linking each spherical photograph within the SiteSee system. Powerful zoom functionality is another feature of the high resolution imagery featured in SiteSee.

Remove dangerous high risk site inspections from the project work flow and allow Engineers to focus on engineering rather than making costly site visits.

*Experience the benefits immediately at: www.aamhatch.com/sitesee*

*Above: An unwrapped 360˚ image of a site created from SiteSee, showing the zoom functionality*

# Pictometry Imagery for 2010 Soccer World Cup Sites

AOC (part of the AAMHatch Group) is deploying world's best practice technologies to assist South Africa manage and promote the World Cup from every angle – from planning, security and tourism to web based online participation from viewers around the world.

AOC has captured Pictometry® oblique imagery of five CBD areas and six Soccer World Cup Stadium sites for the Johannesburg Metropolitan Council. The contract covers initial capture and updates under a three year maintenance agreement.

Pictometry provides detailed, oblique and vertical digital aerial imagery and is ideally suited to many functions allied to the 2010 Soccer World Cup event, including security planning, traffic studies, access control, emergency services and tourism.

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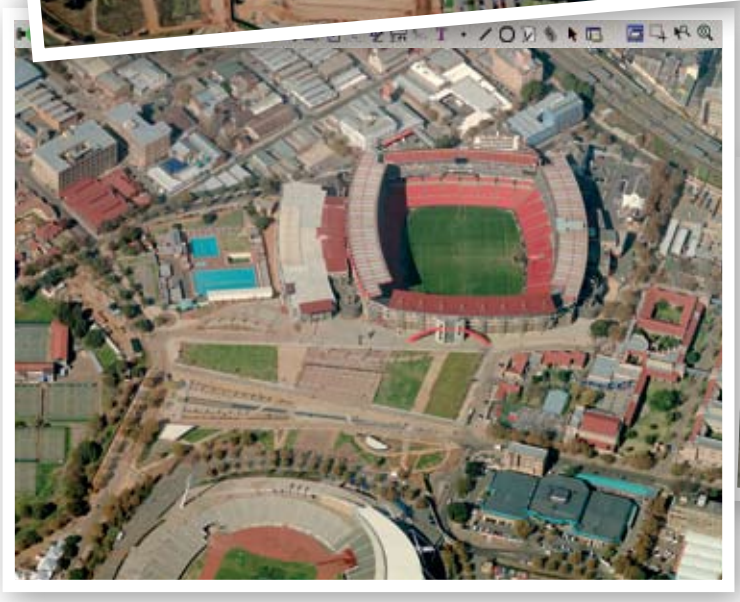
The user interface and tools have the ability to provide intelligent imagery unlike any other system available. A digital warehouse of oblique and nadir (vertical) images is the foundation of this product. Oblique is the term used to describe an aerial photograph that is taken at an angle other than a right angle. This means that a feature, such as a house, building, street light or fire hydrant can be seen in its entirety, rather than the conventional top down (orthogonal) perspective of aerial photography. The result is a new revolutionary way to use aerial imaging.

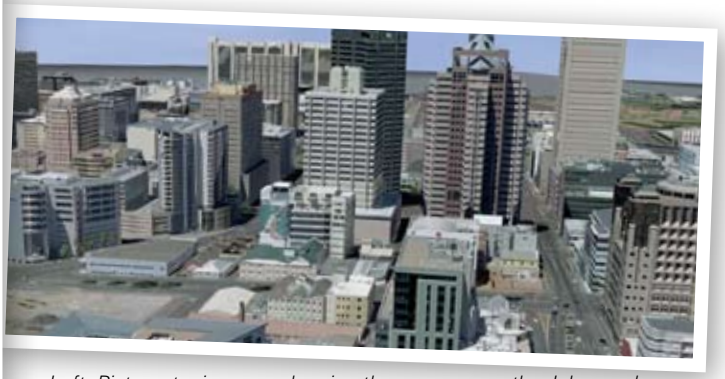
Pictometry's georeferenced imagery can be loaded into common GIS platforms such as ESRI's ArcGIS so that it seamlessly overlays and interacts with existing spatial datasets.

Pictometry capture across other metro's, cities and towns has commenced. Metse Phiyega, AOC's Business Development Director, states, "AOC is the exclusive supplier of this new imagery for Southern Africa and will provide oblique imagery solutions to the various municipal and government authorities to ensure that the full benefit of this exciting technology is available throughout the region."

AOC will also concentrate on the creation of fully rendered 3D models of the 2010 Soccer World Cup Stadiums, their immediate precincts and full coverage of all major metro areas.

*For further information on Pictometry, visit: www.aamhatch.com/pictometry*





*Left: Pictometry imagery showing the progress on the Johannesburg Soccer stadiums being built for the 2010 Soccer World Cup*
*Above: 3D city model of Cape Town*

# GeoEye-1 Product Accuracy – Ortho Imagery and Terrain Data

An area of 269km$^2$ was captured in stereo by the GeoEye-1 satellite for engineering design purposes.

The GeoEye-1 satellite was used to generate accurate 0.5m orthoimagery and 2m contours over the site. The purpose of the imagery was for use during preliminary engineering design for an energy client.

## Accuracies

The GeoEye-1 stereo imagery yielded excellent accuracy results using the 14 ground control points provided. The horizontal and vertical accuracies for both the orthoimage and the resulting digital elevation model are currently being field assessed by the client but are expected to be within one pixel.

Independent accuracy assessment results of GeoEye-1 have been published by Fraser & Ravanbakhsh in the leading industry journal, 'Photogrammetric Engineering and Remote Sensing' (2009). These results indicate that, by using a specialised point measurement technique and a single high quality GCP, geopositioning accuracy of 0.1m planimetric and 0.25m in height can be obtained. For surface models over a variety of surface types and a normal measuring method, Fraser & Ravanbakhsh suggest a digital terrain model height accuracy of 1m or better can be obtained.

Independent accuracy assessment by AAMHatch will be provided in coming weeks.

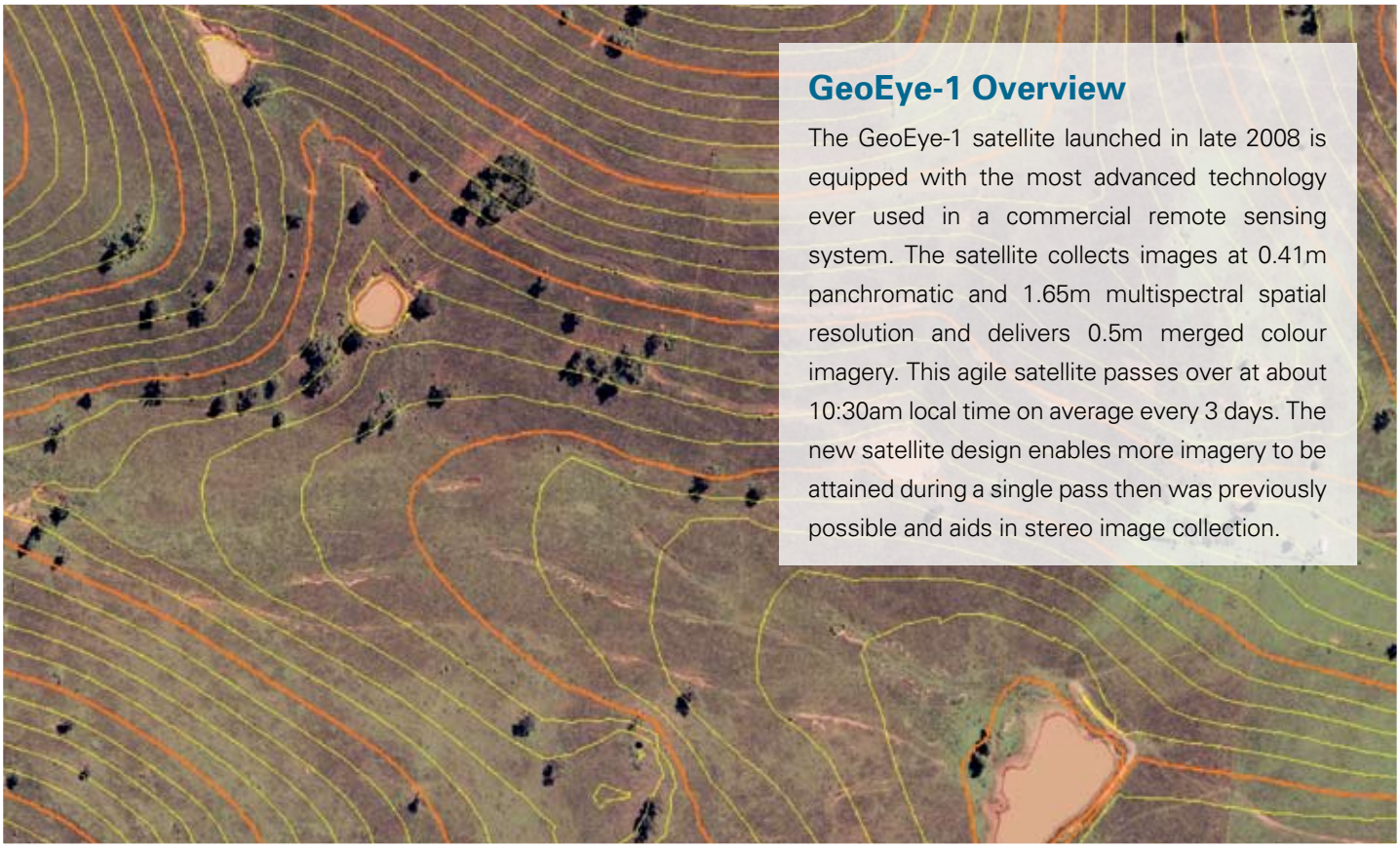
## Client Feedback

"The data arrived today. I have looked at the data and it looks great. The current format works perfectly with our design software. Very pleased with this format and the results it provides."
Mark, Registered Surveyor.

## Project Details

| | |
|---|---|
| Area Size | 269km$^2$ |
| Pixel Resolution | 0.5m |
| Order Placed | February 2009 |
| Cloud Cover | 0% |

*For further information on satellite imagery, visit: www.aamhatch.com/satellite*



## GeoEye-1 Overview

The GeoEye-1 satellite launched in late 2008 is equipped with the most advanced technology ever used in a commercial remote sensing system. The satellite collects images at 0.41m panchromatic and 1.65m multispectral spatial resolution and delivers 0.5m merged colour imagery. This agile satellite passes over at about 10:30am local time on average every 3 days. The new satellite design enables more imagery to be attained during a single pass then was previously possible and aids in stereo image collection.

*Above: 2m contours over the site created from 0.5m GeoEye-1 stereo satellite imagery*

# Social Responsibility

For the last year, AOC (part of the AAMHatch Group) has been training three disadvantaged South Africans in the use of basic computing and mapping skills.

Initially employed to perform the manual scanning of large format films, Tandeka Lufele, Nosiphiwo Jonas and Xoliswa Hiti were then trained to meet AOC's expansion into digital photography. Kym Kruse was engaged as an effort by AOC to train within, rather than outsourcing, which would have ultimately made these women's positions redundant.

On completion of basic computer training, concepts of perspective, spatial awareness and problem solving skills were instilled, allowing the three trainees to join the production team to learn Pictometry® and LiDAR. One of the unforeseen outcomes of this training is the transformation in confidence and communication skills of all three trainees.

*Below: Tandeka Lufele being presented with her certificate by Martin Sanderson, AOC Managing Director and Kym Kruse, AOC Trainer*

# Martin John Sanderson

Martin recently retired from AOC after 43 years with the company.

Martin started in survey with the Department of Federal Surveys based in Salisbury (now Harare) in the Federation of the Rhodesias and Nyasaland in 1956. These were pioneering days when teams of surveyors would disappear into the bush for months on end with 4X4 vehicles and helicopters and were self sufficient in all respects including hunting for the pot.

In 1966 Martin joined AOC in Johannesburg as a photogrammetrist and worked in AOC regional offices in Windhoek and Salisbury. His early harsh field days came in useful on a ground survey project in Lesotho when he went into the highlands for 4 weeks with a small team and mules for transport.

He quickly rose through the ranks and managed a wide range of disciplines such as the Road and Railway engineering department. Martin introduced computers to AOC with the resultant need to write programs for engineering, photogrammetric and airborne applications. Martin became a Director in the 1970's and served as such until his retirement.

His involvement in airborne geophysics saw him travel extensively worldwide on estimating and logistical missions. He was also involved in planning and implementing a number of innovative and unique geophysical solutions to keep AOC as a leader in the field.

Martin eventually ended as a co-owner of AOC with long time colleague George Wood. George retired in 2008 with Martin following in 2009 now that the transition to AAMHatch ownership had been successfully completed.

# Contouring a Kingdom

In another first for AOC (part of the AAMHatch Group), the Kingdom of Lesotho has been mapped.

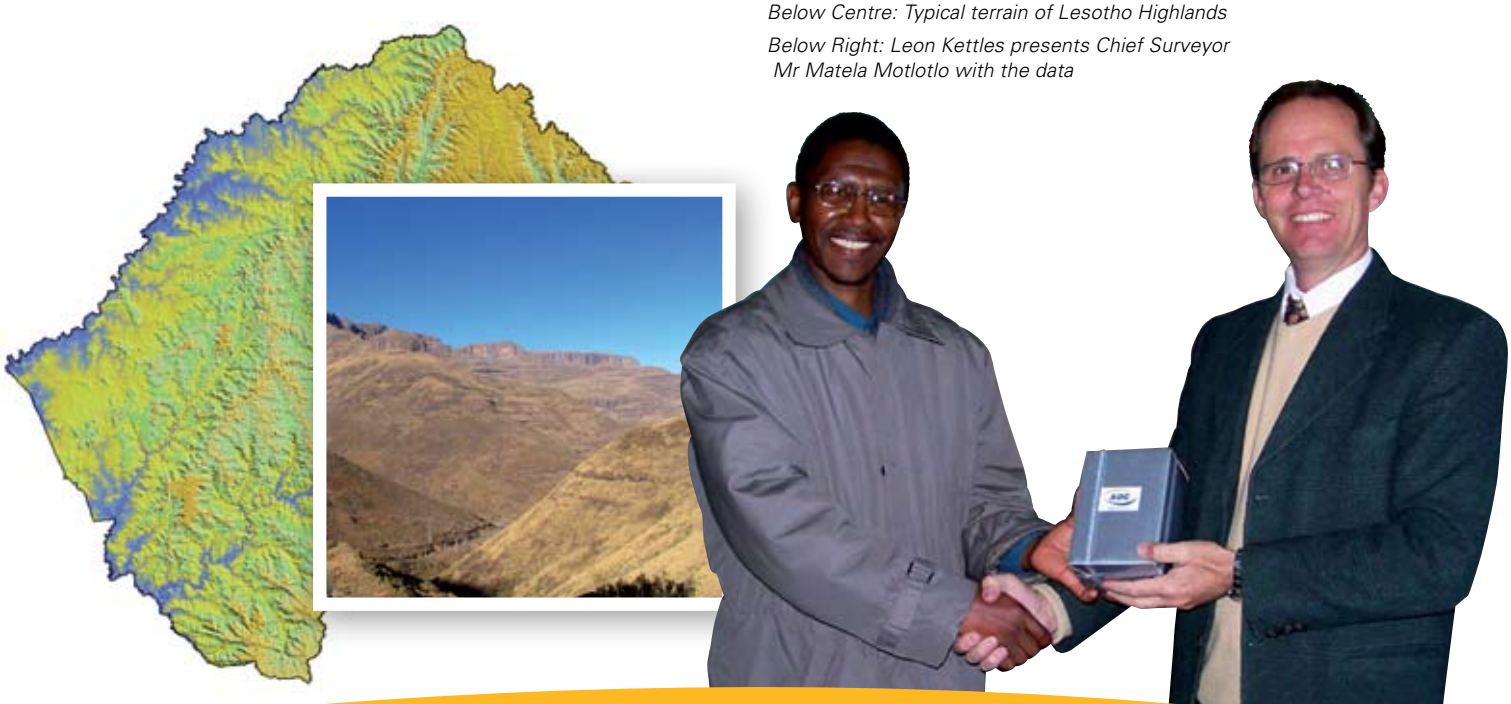
Lesotho is a small, independent nation 3,055,063ha in size. It is known as "the Mountain Kingdom", with many peaks over 3000m, and the highest "low" point of any country in the world at 1433m. Geographically, most of Lesotho is a high mountain plateau, carved out by river valleys. The lowlands are the area between the first range of mountains and the Mohokare River. The area between the first range of mountains and the eastern border is known as the highlands. A striking feature of the Lesotho landscape is the lack of trees. The country consists mostly of grasslands with woody shrubs.

The Department of Land Surveys and Physical Planning requested 2m contours across the lowlands and 20m contours across the highlands of the country. This was achieved in two parts – one part via aerial photography and one part via satellite imagery. Existing photography, captured by AOC, was used to create a Digital Elevation Model (DEM) across the lowlands. The data was subsequently manually edited and contours created. In addition, AOC captured the capital Maseru with LiDAR and provided 0.5m contours, a digital terrain model and a 13cm resolution orthophoto.

The highland contours were generated through the use of triplet sets of satellite imagery. The Japanese Advanced Land Observing Satellite (ALOS) captured stereoscopic images along the satellite's track which were best suited for high resolution DEM generation. The coverage of ALOS was incomplete, so a single strip of SPOT 5 DEM was merged to create a comprehensive terrain model. AAMHatch generated a DEM from the ALOS data and subsequently contours across the highlands were created. Considerable time was spent ensuring that the data was consistent between the lowland and highland mapping. The data was checked for accuracy via a series a ground control points collected across the country. Results confirmed the project was within specification.

Chief Surveyor of the Kingdom of Lesotho, Mr Matela Motlotlo welcomed delivery of a new PC containing both lowland and highland datasets compatible with ESRI™ ArcGIS 9.2 along with a LiDAR dataset covering the Lesotho capital, Maseru. A plot measuring 1.5m by 3m was presented to the Minister for Local Government and Chieftanship, the Hon. Dr. 'Matumelo Ponts'o Sekatle. As part of AOC's commitment to providing solutions, a return visit is scheduled to conduct training in the use of the dataset within the ESRI environment.

*Below Left: Area of capture*
*Below Centre: Typical terrain of Lesotho Highlands*
*Below Right: Leon Kettles presents Chief Surveyor Mr Matela Motlotlo with the data*



# Nelson Mandela Bay Metropolitan Municipality adopts Pictometry

AOC (part of the AAMHatch Group) has recently completed the flying, image capture, processing and delivery of Pictometry® imagery for the Nelson Mandela Bay Metropolitan Municipality, covering the former Port Elizabeth City and surrounds.

The project covered 1960km² of city, suburban and rural areas stretching from van Stadens River in the West to Sundays River in the East and inland past Uitenhage.

The key factors driving the Municipality's decision to move from a traditional air photo product to Pictometry's analysis tools and multiangle oblique imagery was two tiered:

1. the image warehouse of high resolution digital images (12cm GSD) is unmatched in the South African marketplace; and
2. the numerous, multi-angle images of any location allows users to access and measure all sides of any feature or area quickly and easily.

Stephen Canter, GIS Manager for the NMBM, advised "These two factors made selection of Pictometry a simple choice. Our Valuation and Disaster Management Sections immediately saw the benefits of Pictometry; with over 12 oblique views of any location.

"The multiple, georeferenced views and the power of the measurement functions greatly aid desktop verification of structures on properties, as well as identify increased population density within informal settlements."

In addition to the traditional engineering and town planning roles, the Pictometry content will be used by the tourism, emergency response, disaster management, law enforcement and beach and parks departments.

As a tool for property valuations, Pictometry is invaluable by reducing fieldwork, dealing with objections and as input to the Computer Assisted Mass Appraisal (CAMA) functions. It is predicted that improvements on these valuation tasks alone will recover the costs of the Pictometry imagery over a two year period.

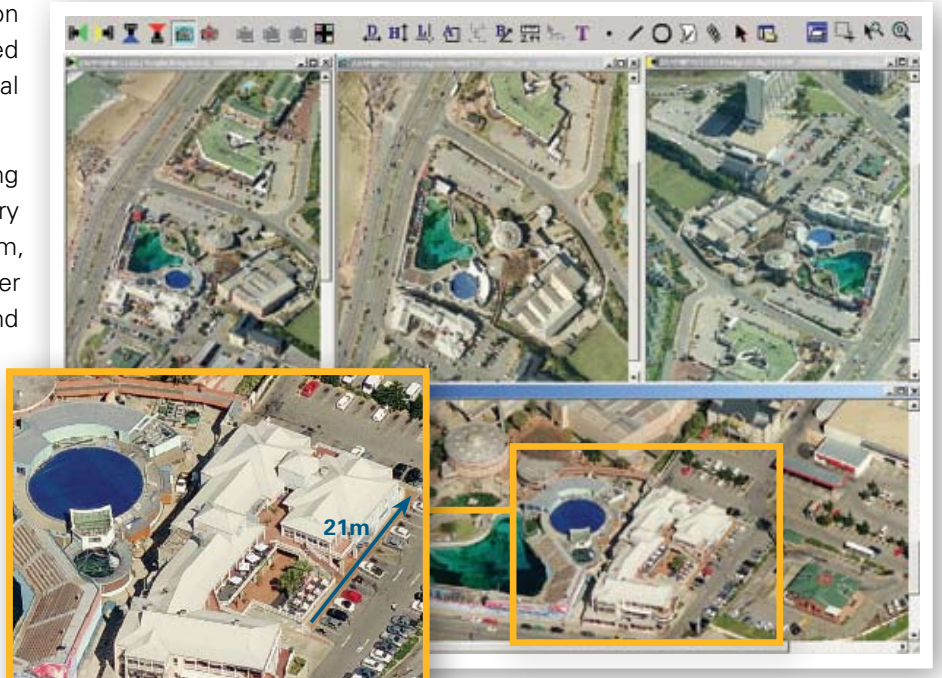
Pictometry will provide a valuable dataset for the next phase of the GIS evolution, namely the generation of fully rendered 3D building models. Experience in Australia has proven that Pictometry is the ideal source of oblique imagery for the rendering of 3D models. To date, examples of these have been built over parts of Cape Town by AOC and they are being considered for certain architectural and heritage use in Nelson Mandela Metro.

*To view the Cape Town 3D city models, visit: www.aamhatch.com/3dcitymodels*

**It is predicted that the costs of the Pictometry imagery will be recovered over a two year period**

The South African challenges of providing housing and uplifting the poor, requires the involvement of many stakeholders, many of whom are non-technical. The Pictometry obliques will provide a useful method of visualising these challenges and will assist greatly in finding the solutions. AOC sees this as a unique and challenging application of aerial imagery and GIS technology in supporting government and municipal objectives.

*For further information on Pictometry, visit: www.aamhatch.com/pictometry*




*Above: Some of the many features of Pictometry – multiple views, zoom functionality and measuring distance*