The Skyâ€™s the Limit

In 1996 staff of what would become Southern Mapping Company, based in Johannesburg, South Africa, were among the first in the world to offer commercial aerial Lidar (light detection and ranging) survey. The service was quickly recognised by mining, infrastructure and environmental companies as providing the most accurate surface-terrain model information available. Today more than 50% of SMC activities are conducted on behalf of local and international mining clients.<P>

Although SMC was founded only in January 2007, its team has been working with Lidar technology since the mid-1990s, when its founders gained experience in the technology from its conception. (Other protagonists of the same era were Optech Incorporated of Canada and SAAB of Sweden: both leaders in advanced laser-based aerial survey equipment.) Before this time the team founded an aerial Lidar company owned by the electrical utility in South Africa and they have worked all over the world, from South America to Germany, Malaysia and Indonesia, as well as in most African sub-Saharan countries. Some SMC staff members have worked together for over twenty years.

Africa on the Map

It was CEO Peter Moir, technical director Jim Vaughan, new business director Norman Banks, and operations director Jannie Engelke who together decided in January 2007 to form a private Aerial Lidar survey company, ‘Southern Mapping Company’, and make the break from the electrical utility. Their mission statement is ‘To put Africa on the Map’. According to Peter Moir, it became increasingly evident that there was a real need for aerial Lidar surveying in the mining, infrastructure and environmental industries; providing this would serve as an extremely viable basis for the formation of a private survey company. For a few years from 1995 these surveyors were the only people on the African continent and in the Southern Hemisphere to commercially combine aerial laser-survey technology with cameras and imagery, and the first in the world to combine aerial lasers and aerial-camera technology. In 2004, as part of the old company, they achieved second place in the ‘Small Business of the Year’ competition. An experienced surveyor and helicopter pilot, Moir and partners undertook the first flight in February 2007 under the new banner of Southern Mapping Company. They were using a leased aeroplane, a laser system manufactured by Optech of Canada, and aerial industrial camera from Rollei of Germany. In February 2008 the company registered a spin-off operation in São Tomé, an island off West Africa, ‘Southern Mapping Company STP Lda’. This was for geographical reasons, since the island is close to the company’s West African market of Nigeria, Cameroon, the Democratic Republic of Congo, Sierra Leone, etc.

Diamonds are Forever

One of the initial surveys was undertaken for the world’s leading diamond mining company, De Beers, to provide Lidar aerial information on its Namaqualand and the Alexkor diamond mines, a joint venture with the South African government. Since then SMC has experienced exponential growth both within and beyond the global mining sector, conducting aerial Lidar surveys for power and pipeline utilities, urban developers, road and railway authorities, and telecommunications companies. Today its staff comprises 22 experts with backgrounds in surveying and aviation.

Jet Aircraft Survey

To provide clients with a standard survey package of non-ground points, ground points and orthophotos, SMC harnesses a laser-surveying system operating from a specially modified fixed-wing aircraft. The system fires 100,000 laser pulses (or measurements) per second, and an aerial-survey camera, representing rapid evolution of the technology the capacity of which when first introduced was limited to 5,000 laser pulses per second and is now 200,000 pulses per second. The laser ranges to trees and the ground beneath in a single pass, generating accurate 3D earth-surface data. These surveys are extremely fast and accurate. Another innovation has been the installation of this equipment in an aircraft, rather than the traditional helicopter. Moir estimates that within the next two to three years the survey system will be fast enough to operate from a jet aircraft. SMC uses an ALTM 3100 EA airborne laser terrain-mapper, one of the most advanced Lidar systems in the world, a Rollei AIC (aerial industrial camera) with PhaseOne P45 CCD, and the new professional lenses released in June this year. The new ALTM Orion System is soon to be added to this hi-tech arsenal.

Discriminating System

Lidar fires a pulsed beam onto an oscillating mirror and projects itdownward. The laser beam hits an object and reflects back to the mirror. The scanner receives reflections of all objects within the area being surveyed. High-speed counters measure the time interval between the pulse leaving the airborne platform and its return to the Lidar sensor. Lidar time-interval measurements are then converted into distances and correlated with information recorded by GPS receiver, Inertial Measurement Unit (IMU), and ground-based GPS stations. A 3D-GPS solution is used to position the laser scanner at each 200th of a second, while the IMU data determines the system’s orientation. The SMC system is capable of discriminating between multiple returns from each pulse, measuring not only the position and geometry of the surface below the aircraft, but also the terrain beneath vegetation cover. Its distinct three-phase approach to aerial Lidar surveying allows SMC to identify and measure the position of on-ground objects, map land surface beneath the vegetation layer and obtain a spatial model of vegetation. This important system feature is processed using data-processing algorithms to create a digital terrain model unaffected by vegetation. Quality control is achieved by performing a calibration flight to ensure the system meets specifications, and conducting preliminary data processing to ensure completeness and integrity.

Recent Development

In a recent development SMC has invested significantly in Hyperspectral imaging technology (collecting image data using radio waves), the first African company to combine this step with Lidar. The company also conducts ongoing research and development into new hardware and software offerings with the potential to be customised to meet client data requirements. Within a very short time SMC has

established an international client base throughout Africa and in the Middle East, Asia and South America. While several competitors have emerged on the scene since SMC was founded last year, Moir believes his company's competitive edge lies in its intimate knowledge of African terrain and of doing business in Africa. Added to this is the team's broad-based and successful track record, backed by its reputation of being 1990s pioneers of the technology in Africa and the Southern Hemisphere. The company's success lies in its team members, and it is determined to maintain its position by holding onto its status as a preferred service provider for the African market. It plans over the next five years to diversify into new growth areas such as emergency-response planning, coastline environmental monitoring, roads survey and property development.

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