

# NZ Aerial Mapping Profile

NZ Aerial Mapping (NZAM) is one of New Zealand's oldest aviation companies with more than 70 years of history and technology development to its claim. The company now provides a complete in-house solution across a variety of airborne imaging technologies, from aerial survey right through to the end photogrammetric and image product.

## A long history

NZAM was founded by Piet van Asch in 1936. Operating from Hastings with a Monospar ST25 twin, Piet obtained contracts to photograph local farms. The following year, NZAM undertook the first aerial survey in New Zealand of the Richardson Range in Otago for the Geological Survey. The company is proud of a long and enduring relationship with Government lands departments, from Lands and Survey in the 1930's through to Land Information New Zealand now.

After managing to avoid integration to the RNZAF at the start of the Second World War, NZAM had by June of 1944 photographed some 66000 square kilometres of land for the war effort. Since then, the company has steadily grown its fleet and its imaging capability as requirements dictated and new technology became available. Capabilities are extensive and reach far beyond traditional aerial photography. As early as the 1970's, NZAM was conducting thermo vision work for the Lands and Survey Department between Taupo and Rotorua to assist with the design of road extensions and cable placements, in order that ground hotspots could be avoided.



NZAM offer a variety of digital image acquisition technologies. In this case Colour Infra Red.

Many changes occurred in the 1990's with the advent of digital technology. The company also made its first foray into Geographical Information Systems (GIS). A Cessna 205 and Piper Aztec were added to the fleet of Aero Commander 680 and 690. Camera technology was complimented by the acquisition of image motion



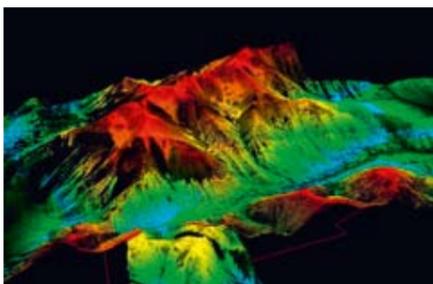
The New Zealand Aerial Mapping fleet at Hastings. L to R; Piper Aztec, Aero Commander 680F, Aero Commander 690, Cessna 402, Aero Commander 690A

compensation, a technology that moves the camera during the photo exposure in order to eliminate drag from the image caused by the forward motion of the aircraft.

Today, NZAM is an international operator of the latest digital imagery acquisition, mapping, laser scanning, thermal and radar technologies. They are the only NZ airborne data capture company using the latest technology LiDAR (Light Detection and Ranging) laser scanning technology (see below).

## International Operations

With offices in Australia, Saudi Arabia, and Kuala Lumpur, NZAM aircraft are frequently tasked to overseas missions and they now base an aircraft in the Middle East for the majority of the year. NZAM crew have operated throughout Africa and also supported the US Geological Survey in Antarctica. Work is often undertaken in the Pacific Islands, recently related to post cyclone mapping and census surveys for local governments and the United Nations.



A LiDAR (Light Detection and Ranging) derived elevation model of the Porter Heights Skifield.

## Aerial Photography

NZAM's five aircraft are specially modified for aerial photography. The company has extensive capabilities of vertical stereo and oblique aerial photography using Trackair GPS navigation aerial photography systems for precise positioning during aerial survey missions

which can be conducted at altitudes up to 31000 feet.

When taking photographs at low altitude, forward motion compensation systems eliminate image deformation. For digital imagery, NZAM have

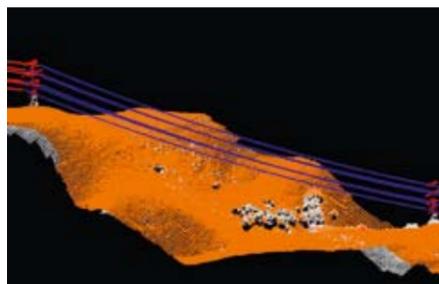
two Microsoft Vexcel UCD and UCX large format digital cameras.

NZAM also maintains an extensive photo library of historical and recent images. Their collection is New Zealand's largest and most comprehensive with over 700,000 photographs that date from 1936 to the present day. This collection is of particular significance for studying historical change over time, with many areas having been photographed several times over the years.

## Mapping Services

A wide range of mapping and orthophotography (combining the visual information of aerial photography with the positional and scale accuracy of a map) services include aerial triangulation, digital elevation capture, contour and topographical feature mapping, orthophoto production and geographic information system (GIS) data production.

Applications are largely unlimited, but typically include topographical



LiDAR transmission line returns. NZAM is the only NZ company operating airborne laser scanning.

mapping, flood and erosion studies, highway engineering, forestry and mining studies, urban management support and telecommunications modelling.

Much of this data is supplied digitally, ready to be input into GIS or CAD (Computer Aided Design) systems.

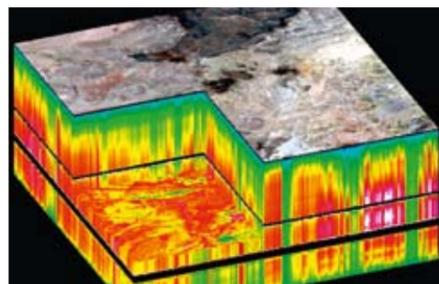
## Digital Imagery Acquisition

NZAM operate two Microsoft Vexcel UltraCam large format digital cameras. Digital image acquisition offers many advantages including there being a greater range of light conditions suitable for photography. Image quality can be verified "on site" in the aircraft, processing time on the ground is faster, and the usability of the image is significantly enhanced with crisper edges and greater details in shadows. Neither are there any issues with film processing, scanning, or duplication. Digital imagery also permits increased forward overlap which reduces apparent building lean and areas obscured by buildings on the finished image.

## Airborne Laser Scanning

LiDAR (Light Detection and Ranging) technology is a cost effective alternative to conventional ground surveying for medium to large scale terrain modelling that offers accuracy far superior to photogrammetric mapping. The process works by collecting highly dense sets of discrete elevation points that represent a sampling of the surface, light is transmitted out to the target which is reflected back to the instrument where it is analysed. Properties of the target can be determined by the changing intensities of light. Range to the target can be determined by the time it takes for the light to travel out to the target and back to the LiDAR equipment.

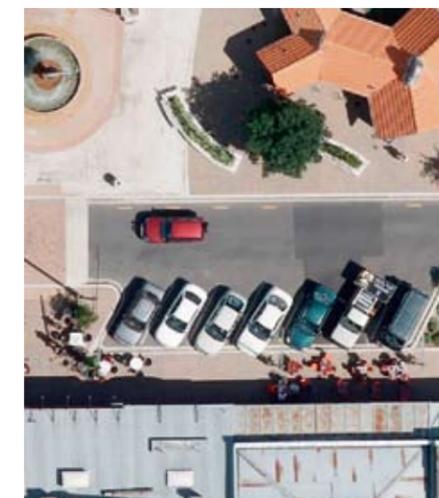
Basic outputs of the LiDAR include determination of spot heights, contours, features, building footprints and heights, road modelling, vegetation measurement and more. For more advanced analysis,



Hyperspectral imaging can detect plant type, trace element status and vegetation health from the air.



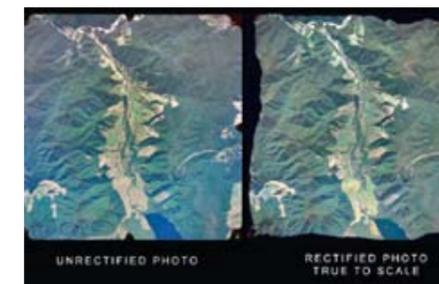
Operating the Vexcel UltraCamX Digital Camera from NZAM's Cessna 402.



An example of UltraCam digital imagery, in this case over Havelock North.



An example of LiDAR derived digital imagery of a Waikato roading project.



An example of photo rectification that provides (at right) the positional and scale accuracy of a map.

NZAM's measurement technology is such that the complete waveform of every return pulse can be analysed to determine details such as surface roughness of the target or slope of terrain. Analysis and interpretation of such outputs can then be used for sophisticated terrain modelling and the creation of virtual reality or 3D fly-through simulations.

Applications of LiDAR include road and engineering design, power line mapping, flood modelling, natural resource assessment, demographic profiling, urban planning, and much more.

## Other Technology and Services

NZAM offer a variety of other mapping technology and services. Thermal Infrared sensing allows surface temperatures to be measured and objects to be located and identified, even at night. The technology can be used for fire hot spot mapping, heat insulation effectiveness in buildings, detecting pipeline leaks, or detecting people and animals.

Passive microwave can measure the radiation emitted from the earth to provide information on surface and sub surface properties.

Radar can be used to penetrate through foliage and the upper layers of the earth's surface to provide information on terrain beneath vegetation, soil moisture and even the stem diameters of woody plants.

Hyperspectral imaging can record light in several hundred bands (compared to human vision which is tuned to just red, green and blue wavelengths). Algal blooms can be mapped, mineral deposits located, and even the make and time in service of vehicle paints estimated. Hyperspectral surveys are used for crop production, toxic contamination analysis and geological prospecting.

NZAM also offer a variety of aviation and engineering services including pilot rating and training on their fleet of five aircraft, instrument and instructor rating renewals, and aircraft, equipment and crew hire. A comprehensive range of engineering services are also available from their Bridge Pa Aerodrome base at Hastings.

## For more information

Contact David Napier at NZAM, phone 06 873 7550, email david@nzam.com or visit www.nzam.com