Aerial Surveying By

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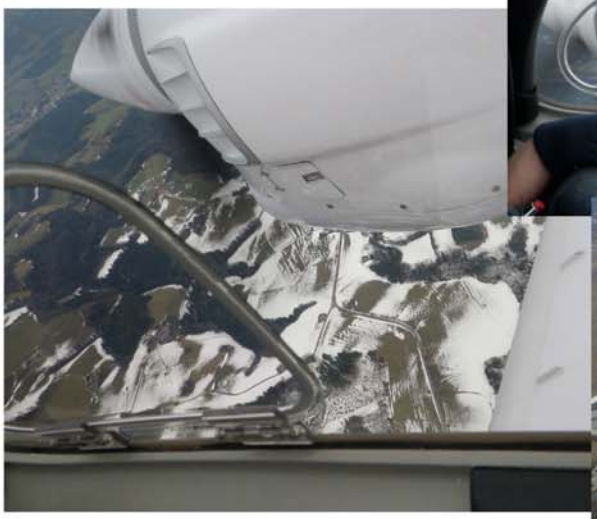
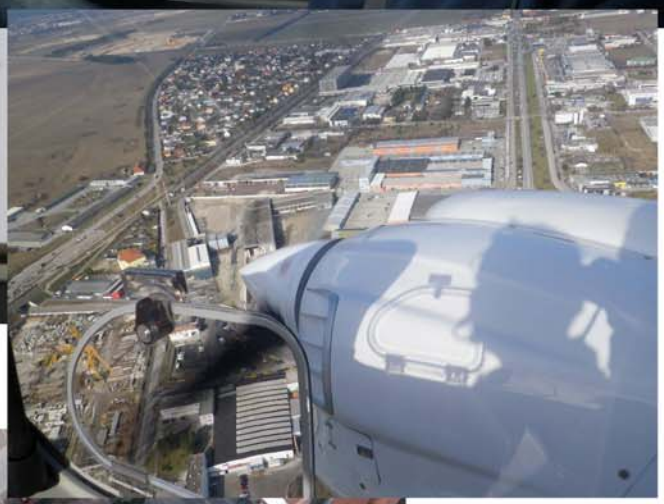
Aerial Survey





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Introduction :

What is Photogrammetry :

- *Photos* – light
- *Gramma* – to draw
- *Metron* – to measure

"Photogrammetry is the technique of measuring objects from photographs"
"The art, science and technology of obtaining reliable spatial information about physical objects and the environment through the processes of recording, measuring and interpreting image data."

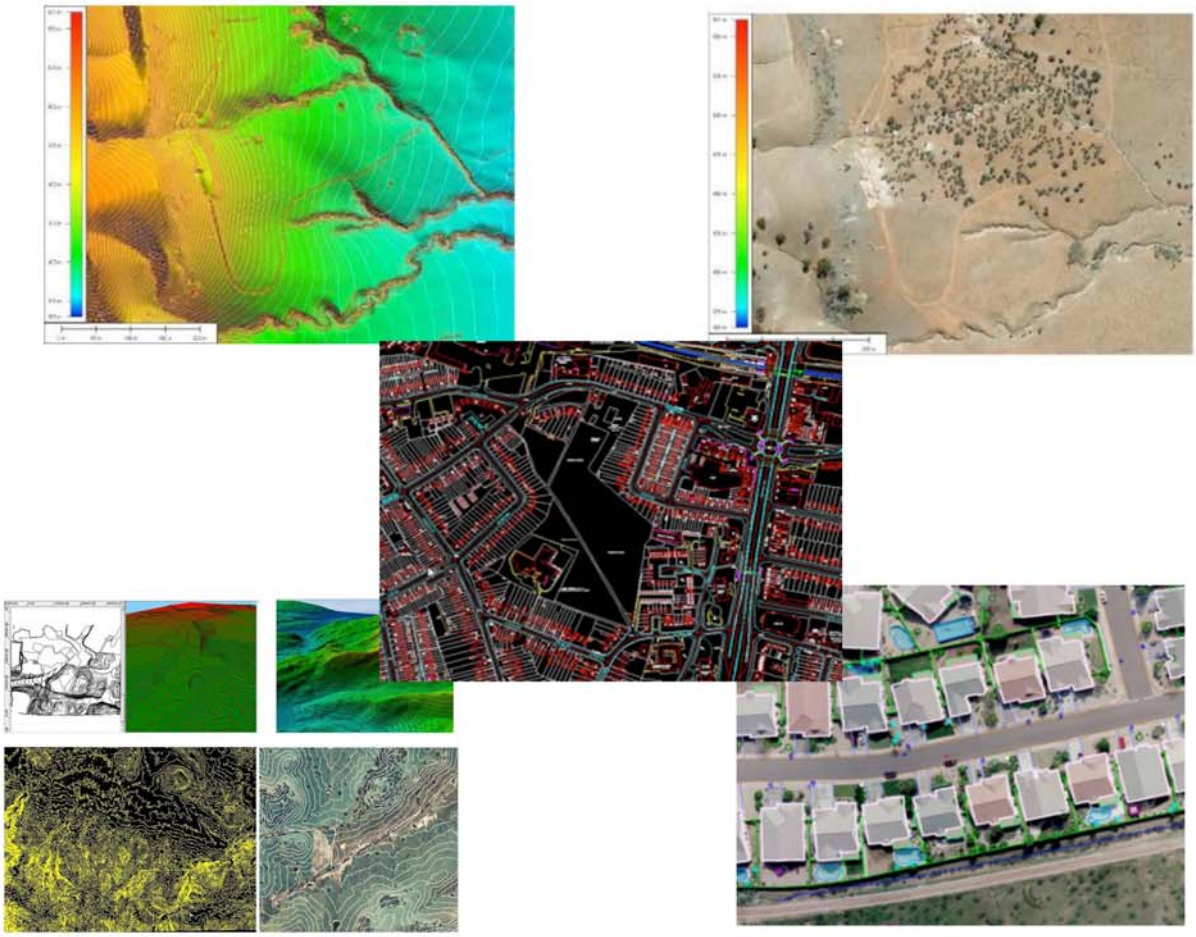
Aerial survey is a geomatics method of collecting information by using aerial photography, LiDAR or from remote sensing imagery using other bands of the electromagnetic spectrum, such as infrared, gamma, or ultraviolet. It can also refer to the chart or map made by analysing a region from the air. This is typically done using aeroplanes, helicopters, UAVs such as theInView Unmanned Aircraft System and in history with balloons. Aerial survey should be distinguished from satellite imagery technologies because of its better resolution, quality and atmospheric conditions. Today, aerial survey is often recognized as a synonym for aerophotogrammetry, part of photogrammetry where the camera is placed in the air. Measurements on aerial images are provided by photogrammetric technologies and methods.

Aerial surveys can provide information on many things not visible from the ground.

WHY PHOTOGRAMMETRY ?

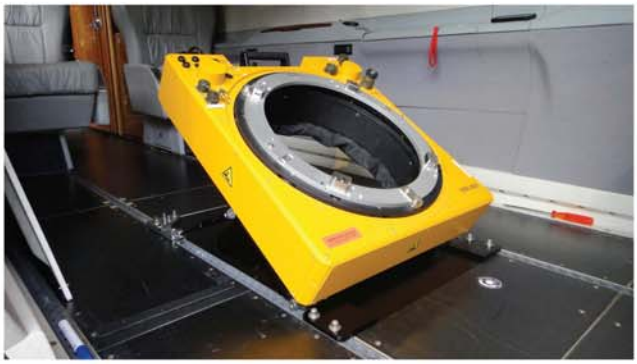
- VERY PRECISE
- 3D REPRESENTATION
- TIME EFFECTIVE
- COST EFFECTIVE
- BASED ON WELL ESTABLISHED AND
- TESTALGORITHMS.
- LESS MANUAL EFFORT
- MORE GEOGRAPHIC FIDELITY

The Target of Aerial Survey is Digital mapping

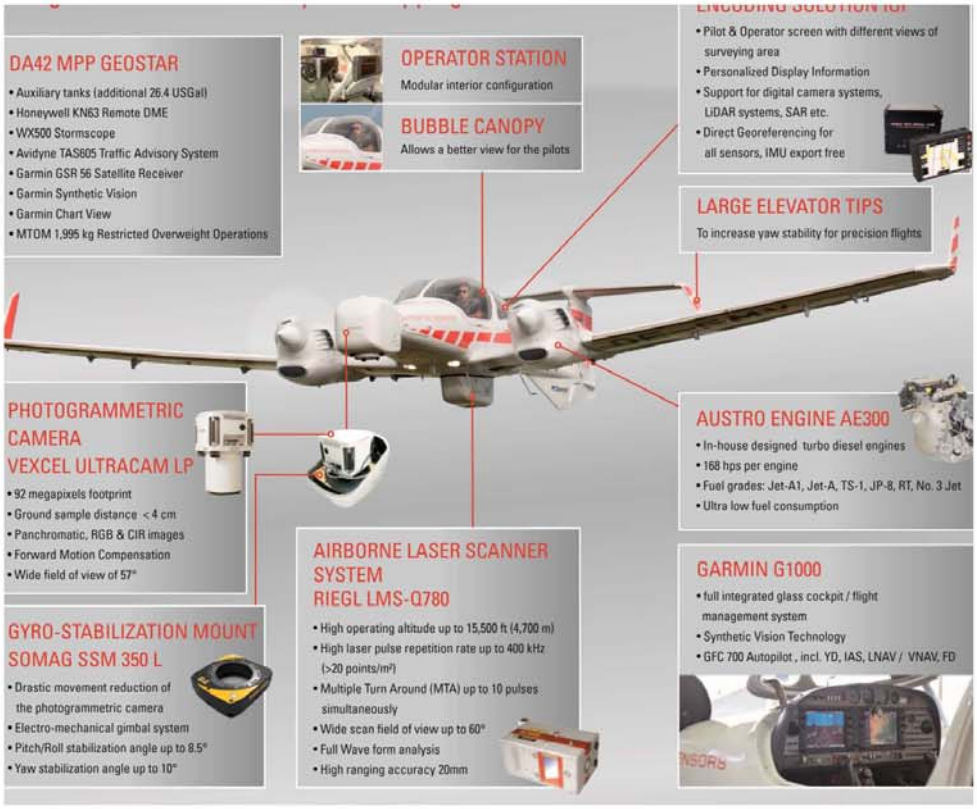


Tools and Instruments used in aerial Survey

1- Airplane
2- Camera
3- Gyroscope
4- GPS



Special Mission aircraft



Special Mission aircraft for surveying :

Precision from Above:
Diamond Airborne Sensing, founded in 2006, is based in Austria and a 100 percent subsidiary of Aircraft Industries, the worldwide 3rd biggest aircraft manufacturer in the General Aviation.
The company enjoys a unique global status as the leading provider of all-in-one sensor turnkey solutions de- livered directly from the aircraft manufacturer. Airborne Sensing's mission solutions comprise a low-cost fixed wing platform, airborne sensors, data- links, command and control centers as well as the co- responding pilot, operator and maintenance training. The cooperation with renowned industry experts and a strong partner network guarantees the employment of cutting-edge technology as well as a competent and re- liable project implementation. This allows us to deliver accurate results with hawk-eyed precision.

A plane like a Swiss army knife,
Based on the award-winning, the DA Multi Purpose Platform Guardian is the ultimate special mission aircraft with an endurance of up to 12 hours while burning only 24.2 liter (6.4 US gal)/hr.
Tomorrow's mission is different than yesterdays? No problem! The plane has been specially designed for carrying easily interchangeable, multi-functional aerial sensor equipment. From EO/IR gimbals for surveillance and reconnaissance missions, large format digital aerial cameras and airborne laser scanners to synthetic aperture radars (SAR) or aeromagnetic survey systems. Mission equipment can be mounted on specific hard points located on the nose and belly of the aircraft as well as in the cabin and nose luggage compartments.
The GUARDIAN also can be used as an UAV (Unmanned Aerial Vehicle)

or
OPV (OptionallyPilotedVehicle)
to provide support capabilities for longer operation times and/or to require operations in regions that are generally too dangerous for manned aircraft to operate.
With a DA MPP you have an approved and certified remote sensing system at your disposal. At the same time powerful and cost efficient and easy to integrate into strategic, constantly available emergency service – a significant advance over most current capabilities.

Special mission Aircrafts

Special mission Aircrafts

Drones or Unmanned Aerial System

UAS or unmanned aerial system or vehicle, is an automobile airplane used Survey and mapping today

An unmanned aerial vehicle (UAV), known as a drone and referred to as a Remotely Piloted Aircraft (RPA, is an aircraft without a pilot. Its flight is controlled either autonomously by the remote control of a pilot on the ground or in another vehicle.

usually deployed for military and special operation applications, but also used in a small but growing number of civil applications, such as policing and firefighting, and nonmilitary security work, such as surveillance of pipelines. UAVs are often preferred for missions that are too "dull, dirty or dangerous"[3] for manned aircraft.

Our goal is to reach the maximum accuracy special data acquisition using UAS.

UAS manufactures divided on producing two types of UAS:

Both products used for capturing images to produce DTM and DEM and DSM.

1-Fixed wing airplane

2- Hexa copter

From Tripods and Trucks to Virtual Surveying

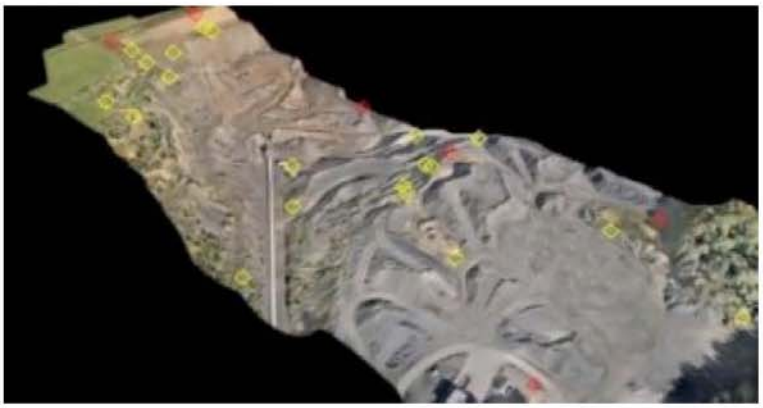
Differential GPS on Tripod

3 years ago Engineers started using Unmanned Aerial Systems (UAS) as complementary surveying devices has spread, With resolutions as high as 1cm, the resulting imagery enables the highly automated production of detailed elevation data, orthophotos and 3D virtual landscapes. However, the gains in efficiency during data acquisition are accompanied by data management challenges and processing efforts which surveyors often underestimate.

Here, I will try to demonstrate how we can make UAS technology e feasible acquiring massive data volumes without

compromising the quality of feature extraction.

First of all The field engineers I select lines and points to correctly and economically capture terrain features in three dimensions. His main task is to balance level of detail (or number of points) and quality. Choosing too many points adds to costs, yet too few points will impede completeness and accuracy. Finding the proper balance relies on the human capacity to analyze the terrain while standing in the midst of it. Field surveys directly result in vector data: point features such as lamp posts or property corners, line features such as tops of ditches or center-lines of roads, and polygons such as property parcels and lakes. Vector data requires minimal post-processing in the office to obtain the specified end product; the field work itself is the most labor-intensive part.



GCPs (red) and check points (yellow) distributed over a quarry

Virtual Surveying:

UAS surveys don't generate vector data. The survey starts with flight planning and aerial survey, resulting in digital images which cover the selected area at approximately equal resolution. Unlike with field surveys, no lines and points are captured during an aerial survey. Instead, this job has to be conducted in the office afterwards using orthophotos and Digital Elevation Models (DEM), both of which can be generated automatically using the proper software.

A typical ground sampling distance (GSD) of a few centimeters results in massive data volumes even when the area to be covered is just a few hectares. For example, a GSD of 2cm results in 2,500 pixels per square meter, which is equivalent to 25 million pixels per hectare. The challenge is to balance data volume with efficiency in feature extraction without loss of quality. Virtual surveying is a solution to this challenge. An easy-to-learn user interface allows intelligent, efficient and accurate feature extraction from realistic visualizations of topographic data (Figure 1).

Surveying in the Model:

Virtual surveying is done in a 3D model which resembles the actual terrain. The surveyor can navigate through the model and measure points by clicking the mouse, just as if he were placing a survey rod over a terrain point. A virtual environment shows the orthophoto draped over the DEM and enables the landscape to be viewed from many different viewpoints. The combination of orthophoto and DEM offers many advantages compared to 'heads-up' digitization of orthophotos alone. The

viewpoint can be easily changed to obtain an optimum perspective of the feature of interest, and zooming and roaming enables terrain features to be interpreted reliably and measured accurately. The surveyor can easily move around or jump over houses, trees, hedges and other obstructions. Furthermore, the 3D representation enables much easier detection of features than the conventional photogrammetric approach. The result is a better and more efficient identification and measurement of features compared to field surveying or conventional photogrammetry.

Designing a noise barrier in a virtual landscape.

Application :

1- Mapping

Aerial surveying and geo-mapping

surveying of the future is not fixed and static, but dynamic and flexible. With the Aibot X6 you can generate data for orthophotos, 3D models, and point clouds in high density with great accuracy. In-house flight planning software makes it simple to obtain all the parameters essential for professional-class photogrammetry.

Wide range of applications

- Survey of challenging sites such as quarries, sand pits, landfills, coal stockpiles, etc.
- Point cloud generation
- Volume calculation
- GM creation
- Creation of location and inventory plans
- Creation of topographic images
- Creation of planning fundamentals

- Documentation of construction progress
- Inner-city survey
- Aerial photographs • Etc.
- You can go places that conventional equipment cannot reach.
- You increase safety for your surveying staff.
- You save time and costs.
- You get high quality, accurate results.
- You benefit from the high level of expertise, the synergies, and the innovation potential of Hexagon brands.

Highway network

2- Engineering Surveying:

Digital Surface Model and orthophoto photography are useful tools for surveying companies in view of internal progress reporting, boundary and topographic surveying, and v calculation. It is absolutely necessary for the surroundings to be surveyed continuously. Dredging companies spend a great deal of time and money on conducting terrestrial survey work, often on a large scale. Trimble UAS are the must have systems for topographic surveying in locations that are often remote,

network of construction

2. Construction networks

Similarly to the industries above, construction companies are faced with the same problems where infrastructural improvement is concerned. In todays ever-changing landscape, on-demand rapid mapping services have become an extremely valuable tool for construction partnerships, modeling and planning. Road works, bridges, ramps, canals and flooding areas can now be easily inspected from the air. Large overviews allow engineers to take the necessary precautions when building infrastructures. Trimble UAS can replace ground surveys and provide more data at shorter intervals for lower overall cost.

3-Industry:

A combination that is quite impressive!

The Aibotix X6 in combination with the thermal Imager optris PI400 is the ideal platform for thermal imaging applications. The stable flight characteristics of the X6 coupled with its dual axis stabilized camera mount generates crisp high-resolution thermal images from the air for example of large-scale solar power plants, industrial buildings and wind turbines

- Inspection of power lines
- Inspection of wind turbines
- Inspection of photovoltaic systems
- Inspection of bridge facilities
- Inspection of oil and gas pipelines
- Inspection of train paths
- Thermal analysis with thermal imaging camera

Inspection of buildings, solar applications, wind turbines and rail systems can be monitored by the multicopter Aibot X6. All images, positioning and flight data can be logged and analyzed in detail.

Inspection of High Voltage Power Lines:

The Aibot X6 combined with a high-quality SLR is the perfect platform to make blur-free images for the inspection of overhead power lines.

Bridge Inspection

The Aibot X6 makes the inspection of inaccessible and difficult to see locations of a bridge possible. A regular inspection of critical points of a bridge system is essential for a good preparation of future maintenance tasks.

Aerial Imaging / Video with Drones:

Whether for movies or pictures of landscapes, concerts, sport-shootings or huge objects – the Aibot X6 creates images from unique perspectives. The multicopter flies safely over land

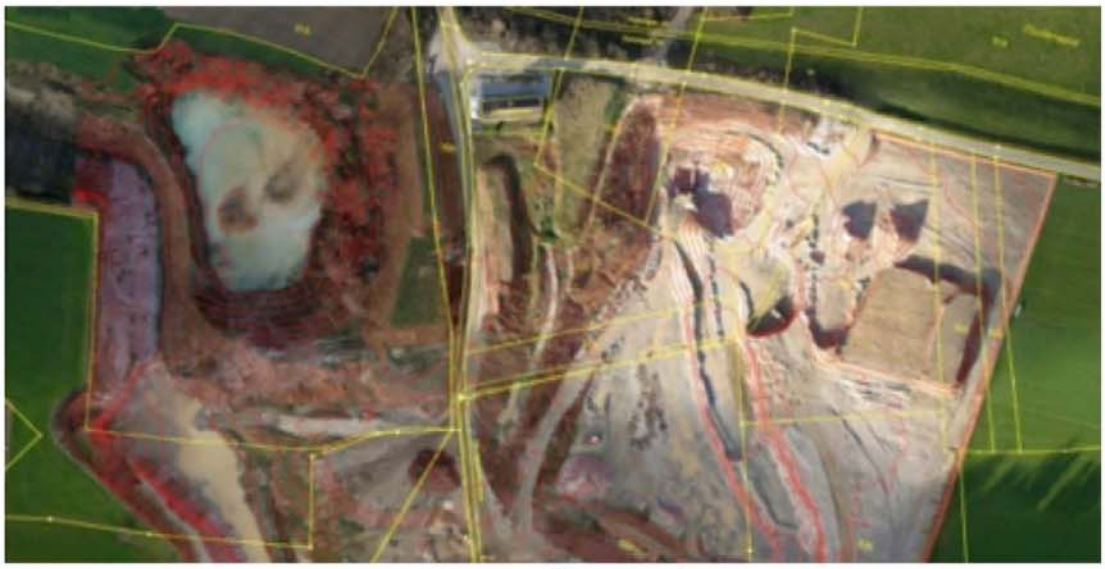
and water. The special position of the camera mount with automatic pitch and roll compensation ensures blur-free images and videos. Modern technology allows an easy operation and crash safety.

Advantages

- More flexible and cheaper than a crane or a helicopter
- Can individually be fitted with DSLR cameras up to 2 kg
- Reliably sharp aerial images
- Easy to control
- Programmable routes
- Ultra lightweight Carbon housing for a maximum of safety

Aerial Imaging :

With a base that holds a load capacity of up to two kilogram, the Aibot X6 can be used in different areas with various image and video systems. The multicopter provides unique images of spectacular moments. A very light casing made of carbon fiber gives the Aibot X6 best flight characteristics and stability. It also protects the rotors and the environment from potential harm.



Topographic surveying

"For us, the X Series is a perfect addition to a total station, a GNSS receiver or a scanner. We use it to produce very accurate orthophotos of gravel pits. Also we determine digital terrain models and do volume calculations with it and all this in a very short time. The X100 follows the preprogrammed flight path very precisely.

As build surveying

We have been using the Fixed wing X series for one season now. This new method has opened new doors in the surveying field. As a remarkable surveying company in Finland. The product range has to be wide and it is important for us that the customer can order the whole project from us.

Using UAS is revolution in all sectors of engineering ,exactly Civil engineering project surveys , generate the most accurate powerful shortness map and digital images to fasten the project exponentially and it cant be compared with any other methods till the effective one

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