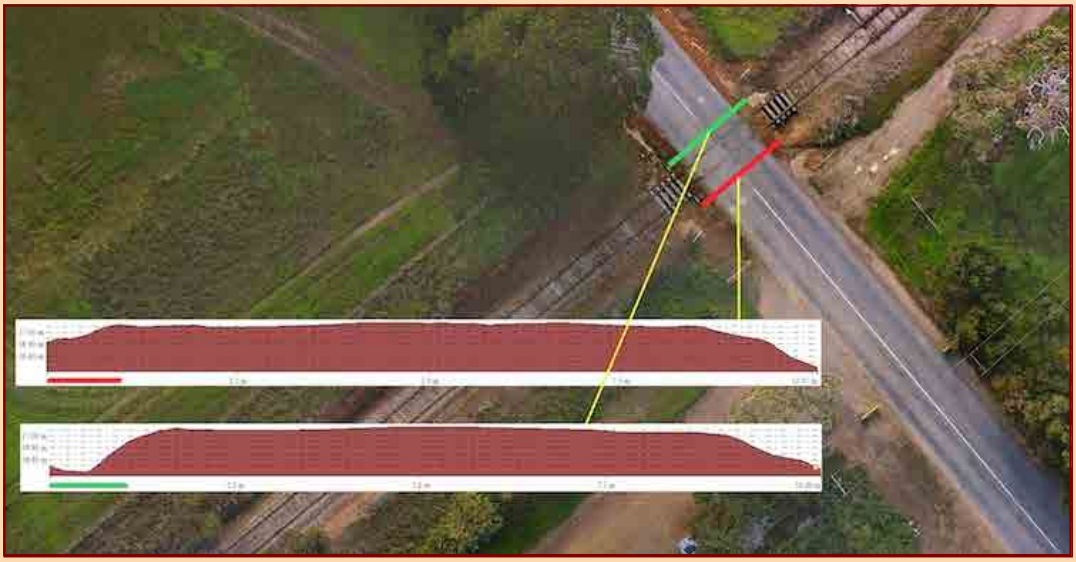


TopoDrone Photogrammetric Mapping

Reliable, Accurate, Safe

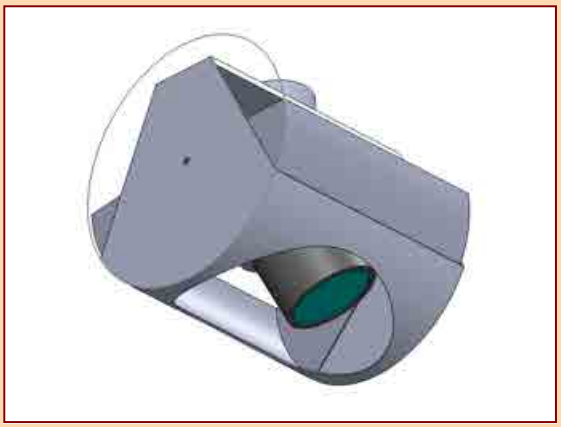
A complete solution for accurate airborne data capture and photogrammetric mapping using an unmanned aerial vehicle

COST EFFICIENT SOLUTION TO CAPTURE AND PROCESS AIRBORNE DATA

The TopoDrone-100 is an unmanned aerial vehicle (UAV) and the only true drone photogrammetric system in the world. The TopoDrone-100 is a cost efficient and time saving solution to capture and process aerial data with unparalleled accuracy.

WHY IS THE TOPODRONE-100 SO DRAMMATICALLY DIFFERENT FROM OTHER UAVs?

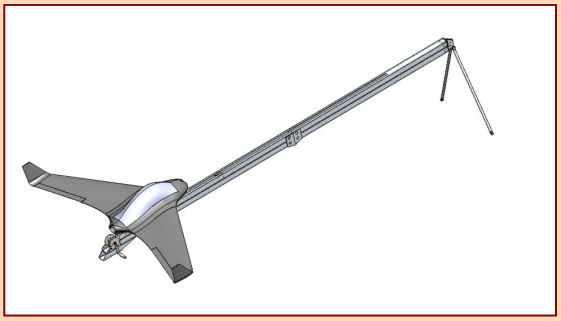
- Unprecedented accuracy: **10mm horizontal and better than 25mm in height!**
- **Revolutionary Dynamic-stabilised Platform** (DMX-DSP) which counteracts the “aggressive” flight movements of any drone
- Upgradable for Direct Georeferencing System (**mapping with no ground control**)/L1/L2/Glonass/GPS/GNSS
- Calibrated large-format prosumer camera (24Mp)
- **Near Infra Red** (NIR) option available **from the same camera**
- Dynamic-stabilised Platform and camera integrated and controlled via in-house developed Maptek Flight software to ensure the nadir camera position with no ‘crab’ angle
- Maptek FlightControl for live update and accurate mission planning
- Maptek FlightDeck: in-house developed photogrammetric software to enable highest mapping possible



TOPODRONE-100 IS THE ONLY TRUE PHOTOGRAMMETRIC MAPPING DRONE SYSTEM IN THE WORLD

UNIQUE FEATURES

- Specifically designed for high accurate photogrammetric mapping
- Autonomous (“self determining”) flight mode
- Launch and land regardless of terrain
- Rapid data acquisition: flight and capture of detailed georeferenced imagery requiring only 2 hours on-site
- Safe & reliable
- Minor on-site intrusion
- Wide range of flying conditions: can fly under clouds and in strong winds



TOPODRONE-100 CAN MAP WITHOUT GROUND CONTROL

GENERAL DESCRIPTION

- **Motor**: electric
- **Launching**: catapult launcher
- **Landing**: belly landing or optional net recovery
- **Propulsion**: electric foldable brushless propeller
- **Battery**: 14.8V, 10000mAh
- **Airframe**: fixed-wing airframe made of EPO (Expanded PolyOlefin), Kevlar nose cone and canopy. Protective doors to camera mount

- **Dimensions**: wing span 2m; length: 80cm; height 20cm
- **Weight**: 4,5kg including payload
- **Endurance**: up to 60min
- **Cruise speed**: 80km/hr
- **Approximate area coverage for mapping missions**: 3 km^2
- **Life-span of the drone**: 200 hours. Maintenance is required every 66 hours
- **Warranty and maintenance**: one year full factory warranty and maintenance

UNPRECEDENTED ACCURACY: 10MM HORIZONTAL AND BETTER THAN 25MM IN HEIGHT

Accuracy:

- **Camera GSD**: 2,5 cm at 400ft
- **Positional accuracy of guiding the drone flight**: within 1-2 metres
- **Mapping positional accuracy**: 25mm in X, Y, Z
- **Absolute accuracy without GCP with our Direct Georeferencing Solution**: 20mm

DroneMetrex offers very accurate multi frequency GNSS/GPS/Glonass with raw file GPS/INS data logging at 100 Hz and nano second camera exposure time synchronisation with GPS time and then post processing the raw data either using the L band corrections from Omnistar or any other available local base station information. Real time satellite subscription eliminates the need for ground base station. Post-processing GPS data will provide 10-15mm accuracy for each air photo station.

THE ONLY DRONE SYSTEM TO ADDRESS EVER-PRESENT GEOMETRIC ERRORS DURING FLIGHT AND ELIMINATE THEM FROM THE START

TOPODRONE-100 COMPONENTS

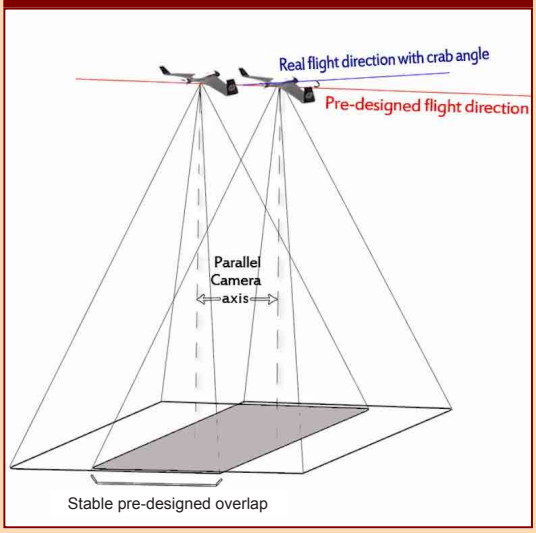
- **Drone with revolutionary Dynamic-stabilised Platform (DMX-DSP):**
  Houses the camera and provides the necessary movements of the camera relative to the airframe flight versus the mapping direction requirements. Designed with an integrated protective door that is closed during launch and landings, and can be activated at any time of the flight sortie from Maptek FlightControl. The Dynamic-stabilised Platform and the camera are integrated and controlled via Maptek Flight software.
- **Our Direct Georeferencing Solution (DGS) – mapping without ground control:**
  Uses L1/L2/Glonass/GPS/GNSS on board; synchronized to the nano-second of the camera shutter to achieve required mapping accuracies. Differential GPS post-processing is then used to obtain the accurate camera positions.

  DGS unique features:
  - No need for ground survey control points
  - Used for larger mapping areas (requires only one flight sortie to cover the full area of mapping)
  - Used for mapping of “challenging” types of terrain and therefore effective pixel matching (such as dense forests, coastal mapping, etc.)

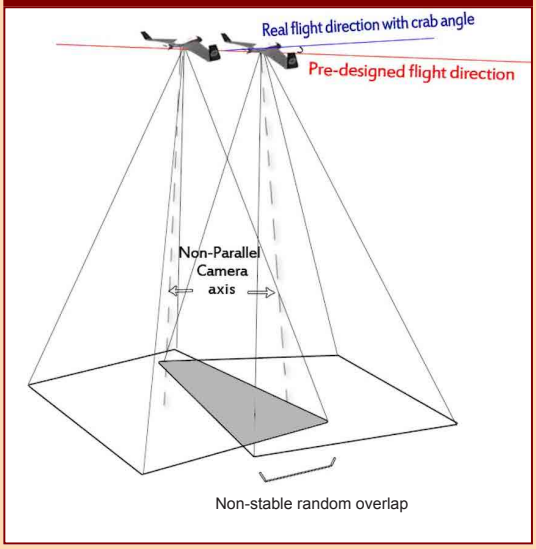
  DGS advantages:
  - Dramatically improves mapping accuracy
  - Reduces data processing time
  - Significantly improves quality of photogrammetric mapping
- **Near Infra Red (NIR) option available from the same camera:**
  Camera is high quality prosumer 24Mp (6000x4000) with fixed 35mm Zeiss lens modified for aerial mapping – full-frame CMOS sensor 5.9µm and leaf shutter:
  - High quality photogrammetric lens
  - Geometric precision
  - Lens calibration

  TopoDrones can capture natural colour imagery as well as 3-band near infra-red imagery. Camera internally modified to enable the same camera to be used for either 3-band natural colour or 3-band near infra red colour imagery.
- **Maptek Flight software:**
  Coded into the autopilot firmware and ensures that each photo is captured in nadir pointing position regardless of the tip and tilt of the airframe. It controls the movement of the DMX-DSP to counterreact and compensate for the airframe tips and tilts. The side wind effect is also compensated so that each and every photo taken is in parallel with the mapping direction regardless of the flight direction, drone body movements, and wind effects.

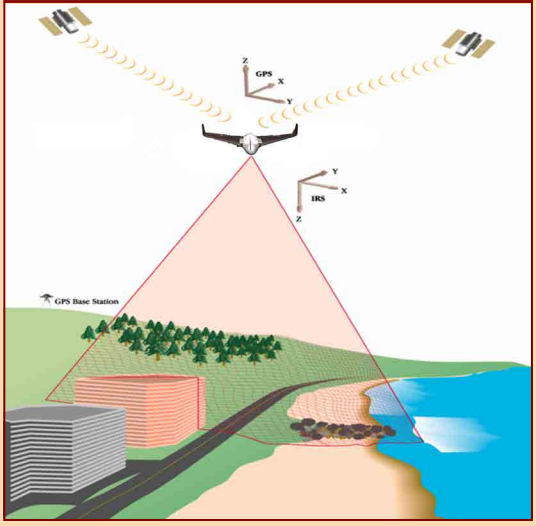
Dynamic-stabilised Platform



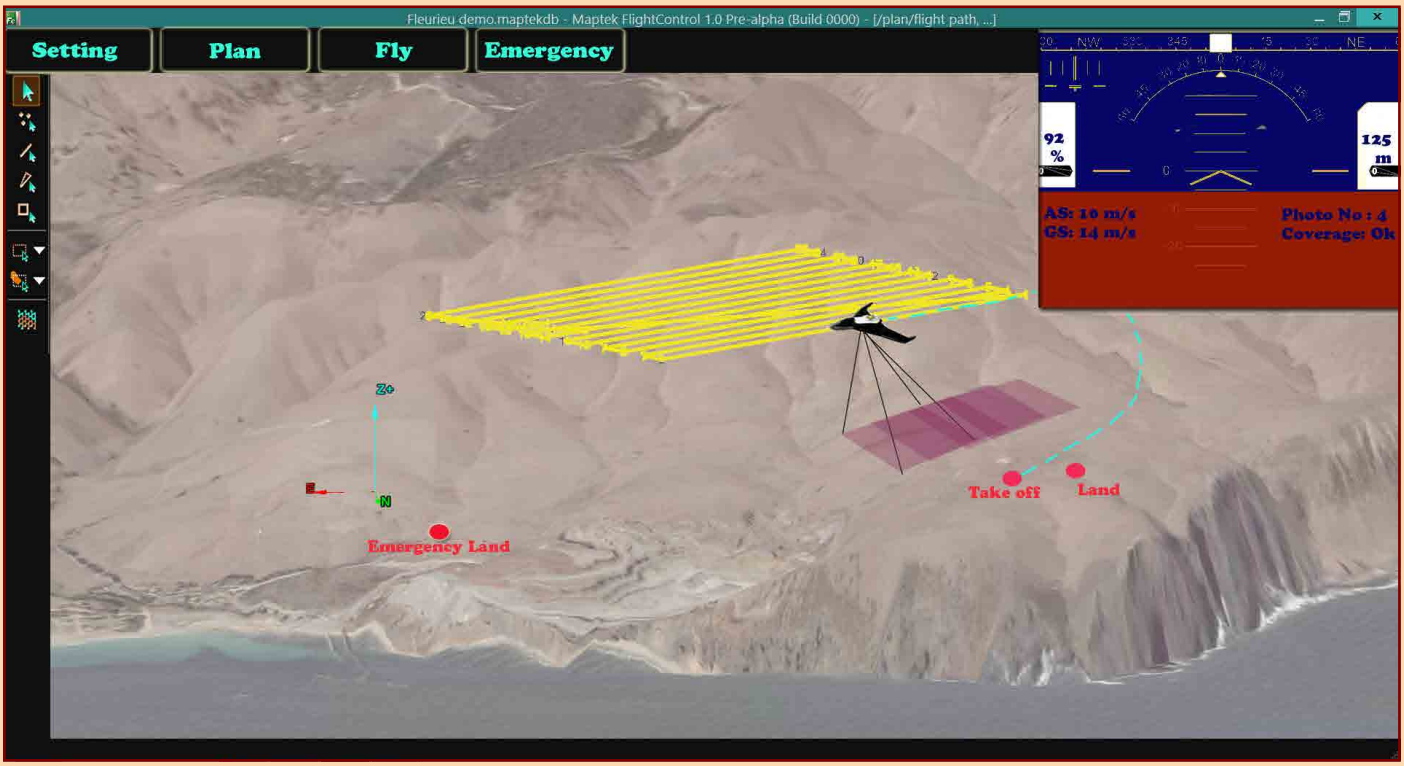
No Dynamic-stabilised Platform



Mapping Without Ground Control



- **Maptek FlightControl:**



Designed for pre-flight project mission planning and also for real-time telemetry control of the flight and photogrammetry mission.

- Considers the terrain heights
- Controls the active camera mount compensation
- Ensures each photo is captured with the predetermined overlap, both forward and side
- Records the GPS synchronization of exact photo coordinates with camera shutter to nanosecond precision
- Via telemetry, accurately guides the drone for photogrammetric autonomous flying
- Live update of each photo footprint with overlap report

- **Catapult Launcher**
- **Operator's Manual**
- **Maintenance Manual**

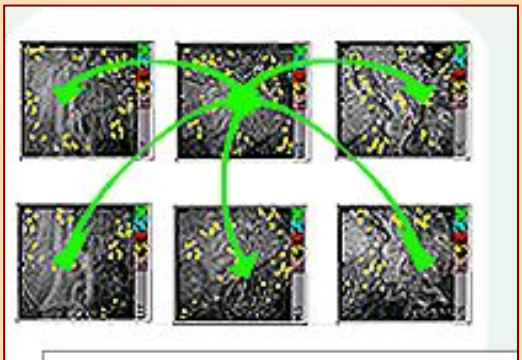
THE ONLY UAV PHOTOGRAMMETRIC SOFTWARE TO CORRECT FOR RANDOM AND SYSTEMATIC ERRORS!

IN-HOUSE DEVELOPED PHOTOGRAMMETRIC SOFTWARE – Maptek FlightDeck

- **Per Pixel photogrammetric Preprocessor**

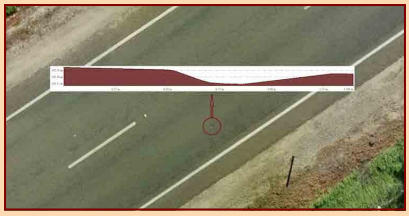
Designed specifically for our photogrammetric mapping:

- Image motion deblurring
- Radiometric adjustments and balancing
- Quality assesment/quality control mission verification success and visualisation



automatic tiepoint measurement and point transfer

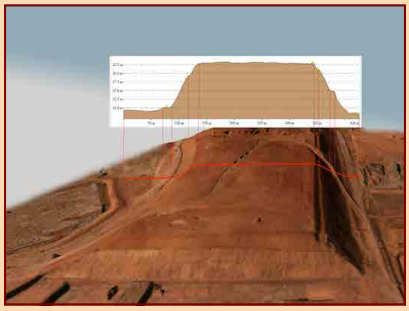
INDUSTRIES AND APPLICATIONS



Surveying

Civil engineering:

- civil works development and weekly monitoring

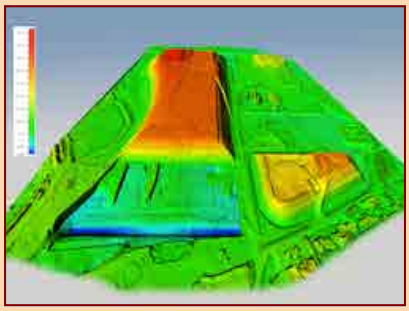


Roads and railroads:

- road corridor mapping - before built for
- planning, as-built for verification
- rapid mapping at the stage of renovation,
- maintenance and regular checks, etc.

Mining industry:

- regular measurement of stockpiles
- truck validation on site
- regular monitoring of the site
- detect, monitor and map changes
- monitor difficult-to-access and dangerous areas
- wall dislocation, deformation or fracturing mapping, etc.



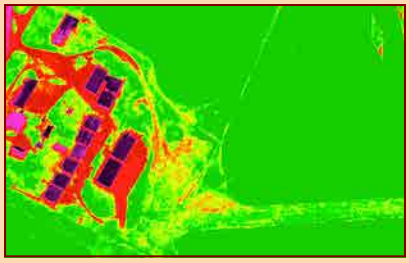
REDUCTION OF HUMAN ACCESS TO REDUCE HEALTH AND SAFETY RISKS

Environmental:

- wildfire mapping
- environmental refuse volumes
- monitoring of dump sites
- blue-green algae outbreaks requiring daily monitoring, etc.

Wine Industry:

- health monitoring
- yield predictions and management
- vegetation stress mapping requiring weekly monitoring, etc.
- underwater mapping to 8m (conditions dependent)



Agriculture:

- fertiliser, weed, pest and livestock monitoring
- crop monitoring and maximisation of yield, etc.

Waste management and recycling

Drainage mapping and analysis

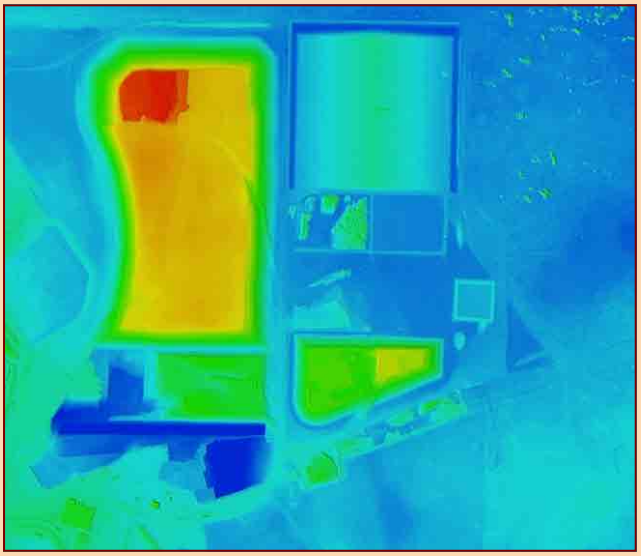
Post disaster mapping

INCREASED TURN-AROUND BUT REDUCED COST

READY FOR STEREO VIEWING AND 3D “HEADS UP” DIGITISING FROM THE START

GENERATED PRODUCTS

- Volumes and profiles
- Digital Terrain Model (DTM) – Bare Earth
- Digital Surface Model (DSM)
- Contours
- 3D photogrammetric “heads-up” feature digitising
- Digitised linework (kerbings, roof tops, GIS assets, etc.)
- Accurate imagery (digital orthophotos, digital seamless orthophoto mosaic of the whole area)



Just like a map an orthomosaics can be used to accurately:

- Make measurements
- Read coordinates
- Map information
- See what is on the ground
- Base layer for GIS

Leaders in UAV Photogrammetric Mapping

DroneMetrex Pty Ltd is an Australian company specialising in automatic, accurate and rigorous mapping using TopoDrones — unmanned aerial vehicles.

This provides a safer, time-efficient and cost-effective solution to very expensive data acquired from a ‘manned’ aircraft or by ground survey teams.

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