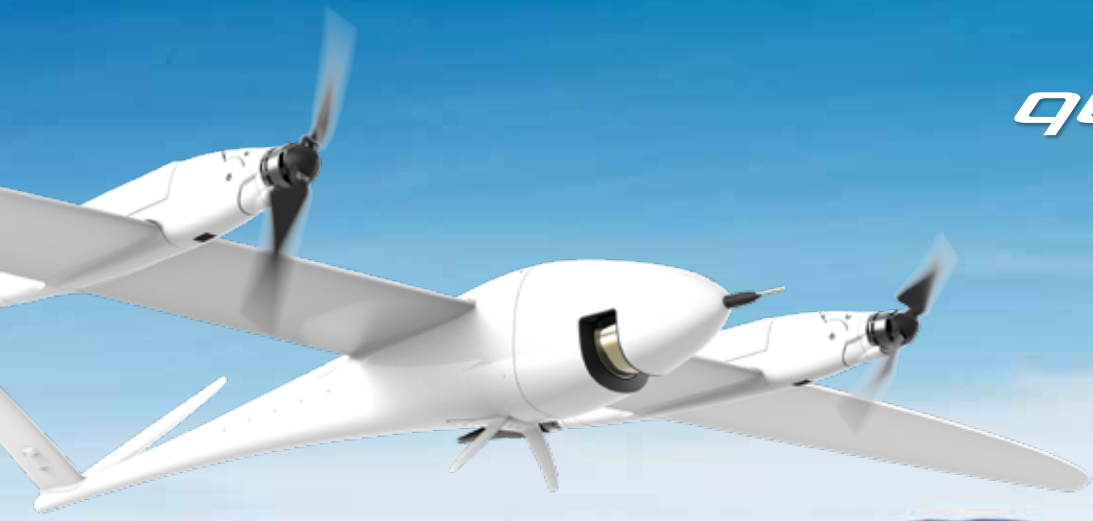


*quantum
systems*



NO COMPROMISE.
JUST FLY.

The advantages of a eVTOL fixed-wing UAV

QUANTUM-UAVS



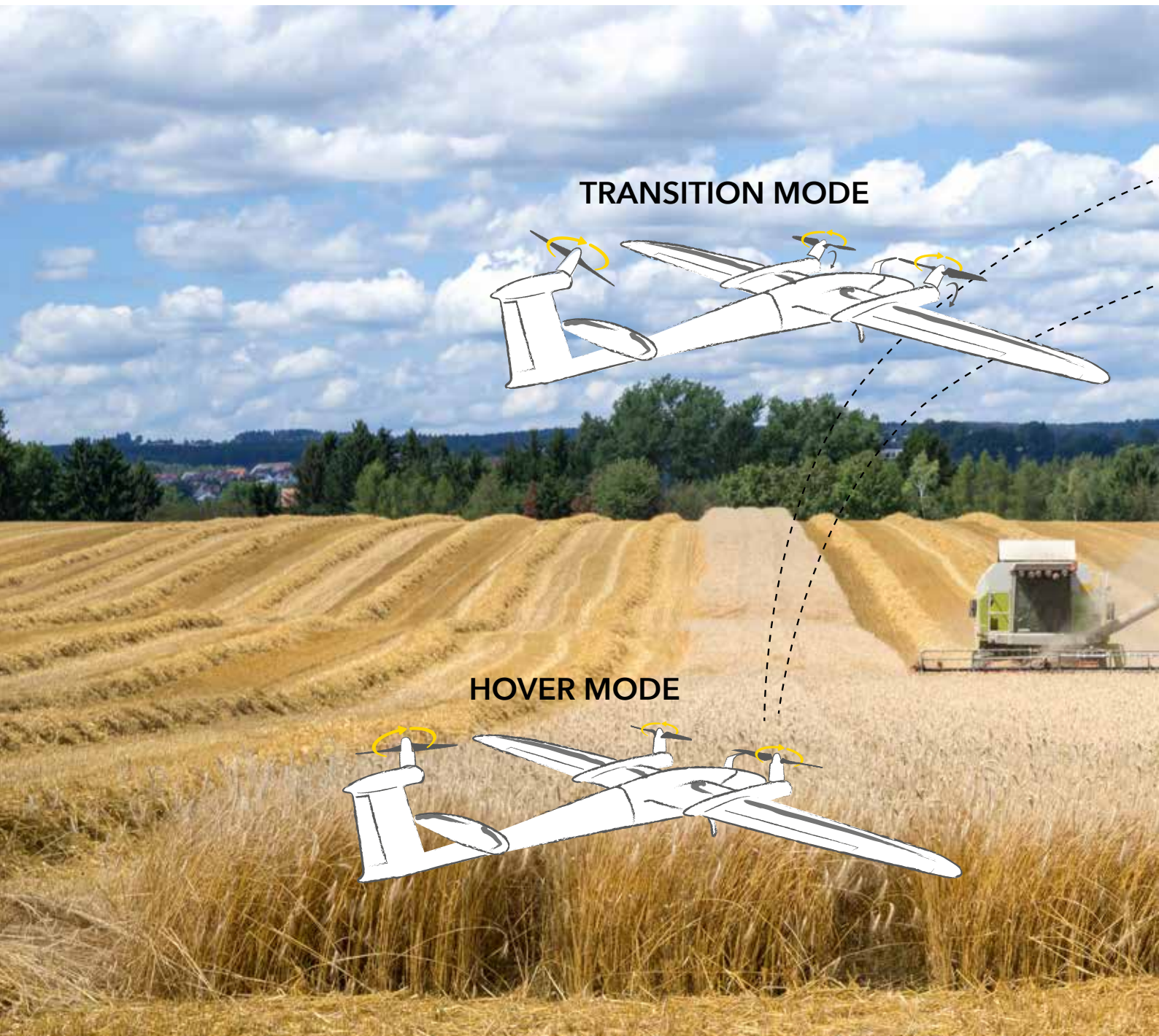
Large payloads

We offer the highest quality sensors currently available and give you the flexibility to add new payloads as your needs change.



Best coverage

Long flight times combined with fast cruising speeds and high quality sensors enable our UAVs to quickly cover large areas at high resolution.





No runways

Take-off and land vertically, from anywhere, no extra equipment needed! Just push a button and our fully integrated autopilot flies safely and efficiently for you.



Made in Germany

Starting with the best materials, we precisely engineer every component and build in redundancy for unsurpassed reliability, ease of handling, and stable autonomous flight.



EFFICIENT CRUISE FLIGHT MODE

ONE-BUTTON SOLUTION

Our fully autonomous UAVs take-off and land vertically like a multicopter, but also fly as efficiently as a plane. No expert training is necessary thanks to our sophisticated hardware and software that work together seamlessly.

PPK combined with the advantages of a eVTOL fixed-wing UAV

TRINITY F90+

With the first version of the Trinity in 2017, we provided the basis for a highly efficient and at the same time affordable VTOL UAV without compromising on features. The Trinity F90+ leverages this platform and improves many aspects to offer professional users even more functionality at an unbeatable price.

- 90+ min flight time in combination with more payload options.
- PPK including Quantum-System iBase ground reference Station.
- Best-in-class sensors incl dual RGB & NDVI payload and 42 MP HighRes RGB.
- Powerful motors for even more reserves in all situations.
- Live Air Traffic (ADS-B) incl. QBase Mission Planning
- 2.4Ghz telemetry with up to 7 km C&C and optional ADS-B Mode-S Transponder

No belly landings

Rough landings should be avoided at any time. We unconditionally rely on vertical take-off and landing (VTOL) to guarantee smooth landings and therefore a long service life. The landing gear additionally supports the safety of the components by offering additional flex.

Easy payload swapping

Payloads can easily be swapped in seconds. No tools are required and the sensors are highly integrated to support the pilots' mission planning.

External access to the data

Access to the recorded data is uncomplicated via external card slots. If more sophisticated storage solutions are necessary, our payload compartment provides enough space for this option.

Efficiency by design

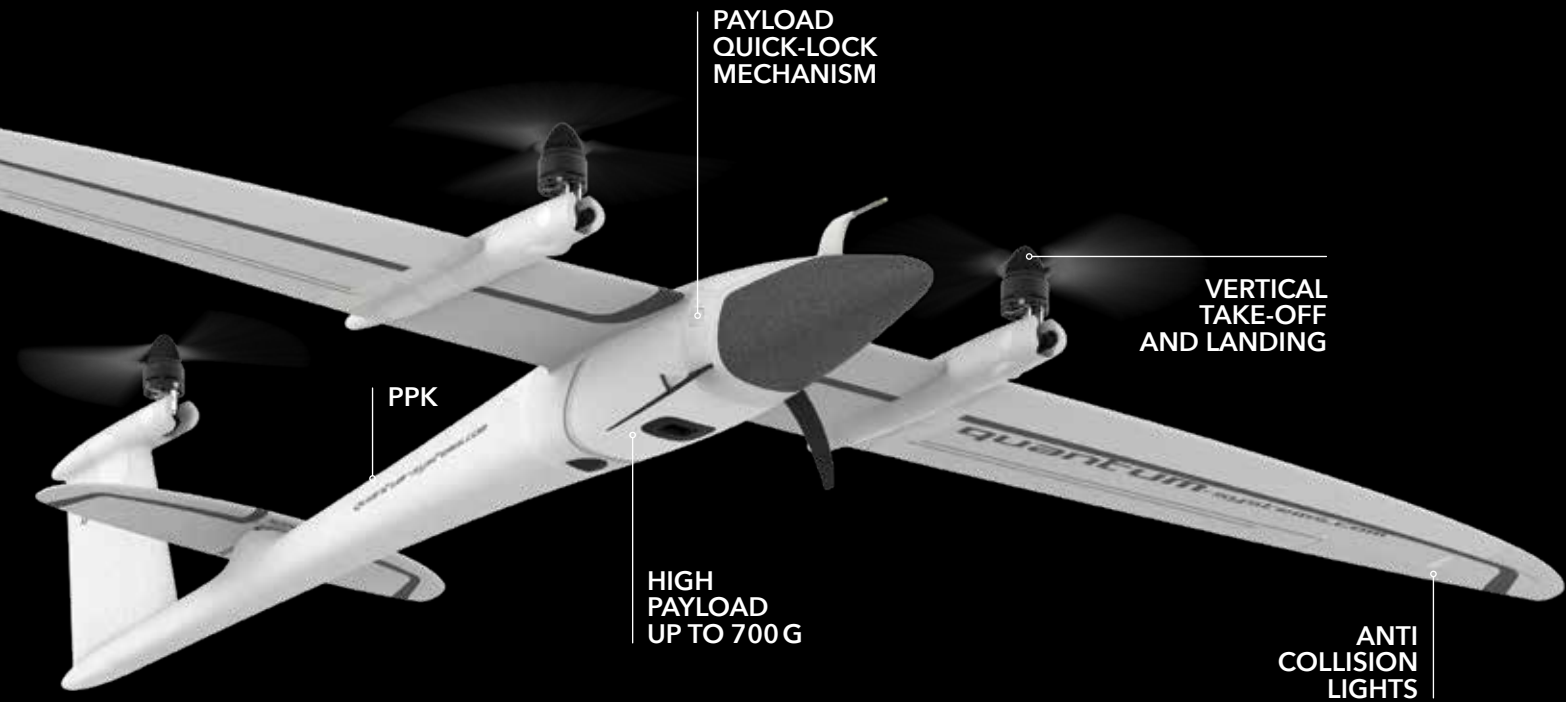
The three-rotor configuration enables the Trinity F90+ to achieve perfect electric VTOL capabilities and a high-efficient long range flight. The perfect weight balance keeps the rear rotor in the ideal thrust-to-size ratio in both VTOL and forward flight modes. A new motor design provides even more reserves for difficult conditions. The Trinity F90+ uses less energy, achieves longer flight times and is an outstanding value for a professional drone.

5 kg WEIGHT	90 * MINUTES	75 km RANGE	max. 700 g PAYLOAD WEIGHT	17 m/s CRUISE SPEED	12 ** m/s WIND	2.394 m WINGSPAN
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* Export permission required.

** In flight.

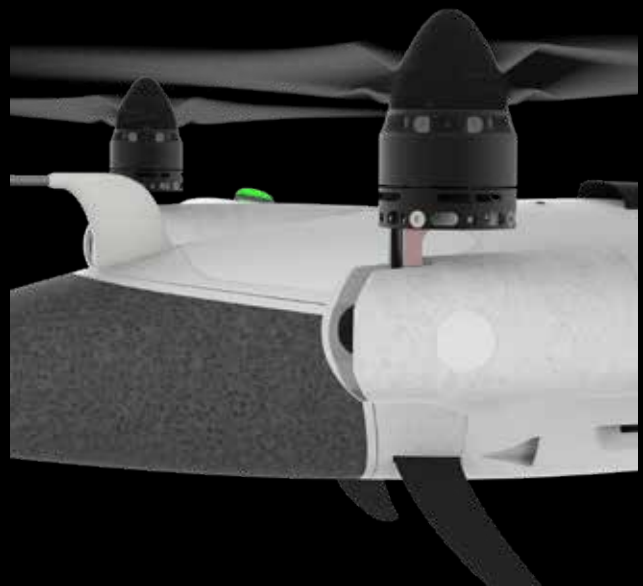


Our autopilot sets new standards

For all our UAVs we rely on a self-developed autopilot. High-quality connections guarantee a longevity that is not available with comparable standard solutions.

Our in-house design puts us in the possibility of certification as we have 100% access to both hardware and software and are not dependent on any third party.

Our customers benefit from future developments and functional enhancements through regular over-the-air updates. This is how we underline the robustness of our products!



2 kg payload in a eVTOL fixed-wing PPK capable UAV

TRON F90+

The Tron F90+ is a professional and high-performing electric UAV that offers outstanding efficiency and elegance. The system has been designed to flexibly, quickly, and safely integrate different sensors in order to meet the needs of a variety of applications.

The quality standards of Quantum-Systems combined with the extremely simple operating concept and high aerodynamic efficiency make the Tron F90+ unique among all other existing drones.

Easy and safe handling

A push of a single button is enough and the Tron will do its assigned job. The remote controller has a clean layout without confusing switches and levers. The Tron F90+ and the remote controller work together seamlessly to get your job done automatically, while still providing emergency override capabilities.

Thanks to Quantum's sophisticated VTOL design, your investment is never in danger due to a flawed hand launch or a rough belly landing.

Superior Sensor and Data result

The Tron F90+ has a 2-kg (4.4-pound) payload capacity for large sensor capabilities. Tron's payload bay offers enough room to accommodate many types of sensors and allows you to gather massive amounts of data in less time.

VTOL fixed-wing

The eVTOL capability, vibration dampening, and secure housing keep the data quality at a high level and protect even the most fragile sensor arrays. Combining eVTOL and fixed wing capabilities into an easy to use system gives you flexible operating areas and the ability to map larger areas than has ever been possible with conventional multicopters.

Blending the best parts of both multicopters and airplanes into one simple robust system was our goal from the initial concept to the completed design. The Tron F90+ is our heavy-payload solution for special applications.

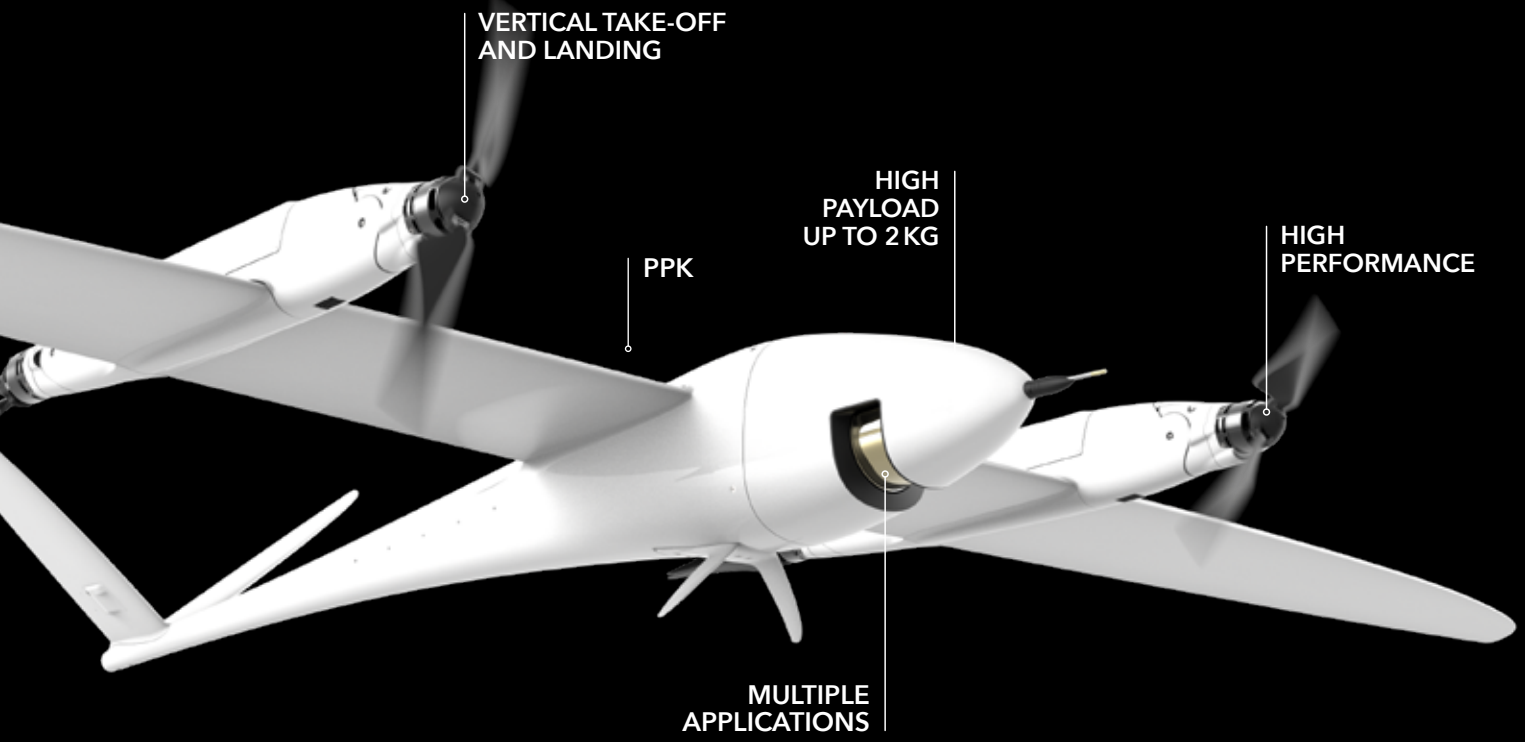
Longest flight time in its class

The carbon fiber composite structure and extended wing span of 3.5 m (11.5 ft) enable the Tron to fly longer and in even stronger wind conditions than would be possible with any other electric UAV carrying the same payload. We dedicated many hours to optimize the wing geometry to push the glide ratio to an astounding 22:1!

High payload

The Tron F90+'s robust and shock-absorbing cargo compartment is able to securely accommodate even the most fragile payload, up to 2 kg (4.4 pounds).





135 kg WEIGHT	90* MINUTES	7.5 km RANGE	2 kg PAYLOAD WEIGHT	18 m/s CRUISE SPEED	12** m/s WIND	3.5 m WINGSPAN
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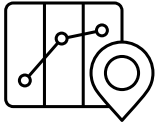


SPAWAR - SPACE AND NAVAL WARFARE SYSTEMS CENTER PACIFIC - HAWAII

* Export permission required.
 ** In flight.

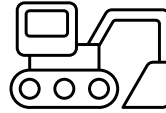
The mapping drone for professionals

APPLICATION SCENARIOS



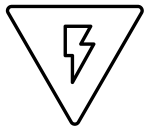
Mapping

- Geo-Referenced aerial images
- Surface Models
- Point Cloud
- Distance and Volume Measure
- Land and infrastructure environment
- Archeological surveys and excavation monitoring



Mining

- Site Planning
- Contour Maps
- Stockpile and slope analysis
- High accuracy without GCPs
- Safe landing despite rough terrain



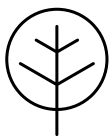
Inspection

- Thermal Inspection
- Optical Inspection
- Multispectral Inspection
- Crop Inspection



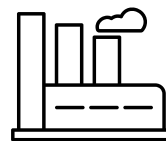
Monitoring

- Mine or quarry monitoring
- Land cover classification
- Monitoring and documentation of the construction progress
- Monitoring of linear infrastructure



Forestry

- Pest Infestation Detection
- Quantity moisture levels
- Analyze tree crown conditions
- Analyze wildlife damage
- Vegetation index creation like NDVI



Industrial

- 3D models of sites
- Aerial inspection
- Construction site surveys

More results in less time

DATA RESULTS

More survey data in less time.

Whether in the agricultural sector, in the mining business or when inspecting industrial plants and construction progress, more data can be recorded in a very short time than it was previously possible with conventional systems.

The Trinity F90+ demonstrates its range advantage in comparison to classic multicopters and other fixed-wing drones due to the longer flight time and covers up to 20x larger areas. The larger the area to be covered, the more attractive the use of the Trinity F90+ will be.

COMPLETE SOLUTION:

The Trinity F90+ is highly efficient, achieves long flight times and is an outstanding value for a professional-grade drone.



PRECISION FARMING



SURVEY & MAPPING



MINING

PPK capability in every situation

PPK and RTK (post-processing kinematics and real-time kinematics) are the algorithms that allow the user to cancel most of GNSS errors via processing data from two receivers that are close enough to each other. They share the same common errors for most error sources such as ionospheric and tropospheric influence on the signal transmission, satellites ephemeris and clock errors.

As it is clear from the names, RTK is performed in real time, PPK - in post-processing.

When properly applied, these algorithms reduce positioning errors from several meters (typical for stand-alone GNSS receivers) down to centimeters.

iBase is an entry level GNSS reference station. It automatically logs GNSS reference measurements on the ground to a file on a micro SD card. This file enables QBase3D to do PPK processing of the collected survey data with an absolute accuracy of 2 - 5 cm.

The advantages of a fixed-wing UAV

F90+ FEATURES

More accuracy with PPK

Geotagging during the flight for various post processing options (Rinex data compatible)



**IBASE
(PPK BASE STATION)**

Geo referencing on the go with iBase

iBase is an entry level GNSS reference station. It automatically logs GNSS reference measurements on the ground to a file on a micro SD card. This file enables the post processing software to do PPK processing of the data collected in flight, to reach the data geotagging absolute precision of down to 2-5 cm (in respect to the point where the iBase antenna is placed).

More range with 2.4Ghz telemetry

The 2.4Ghz telemetry data transmission enables BVLOS flight distances with full control capability.

Live-Air-Traffic

Now it is possible to automatically integrate the Live-Air-Traffic-Info into QBase 3D when ping USB is connected. Ping USB is the world's smallest, lightest and most affordable USB dual-band ADS-B receiver.

Ping USB provides high-quality tracking data for use with software such as Virtual Radar Server and services including ADS-B Exchange.



PING USB

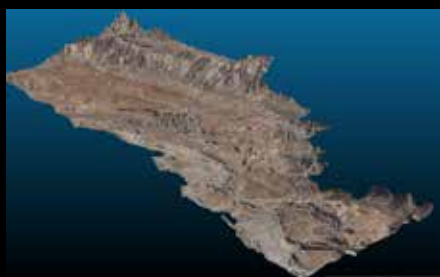


Oman – Topographic survey for a road construction

SONY UMC – USE CASE

UAV TYPE: TRINITY

October 2018



Sultanate of Oman

Renardet S.A. & Partners Consulting Engineers has been appointed by The Ministry of Transportation and Communications for the „Consultancy Services for Design and Supervision for Construction of Shinas - Mahdah Dual Carriageway (Governorates of North Al Batinah and Al Buraimi)“ project.

The topographic survey is part of the project and due to the extension and inaccessibility of the area to be surveyed Renardet and DGRLT agreed to perform it by means of an Unmanned Aerial Vehicle (UAV).



200m AGL | 656 ft



3 m/s | 5.8 kn



Sony UMC-R10C 16mm



40 Min x 20 missions



34° C | 93,2 F



18000



52 km² | 5.200 ha



5 cm | 1.96 inch



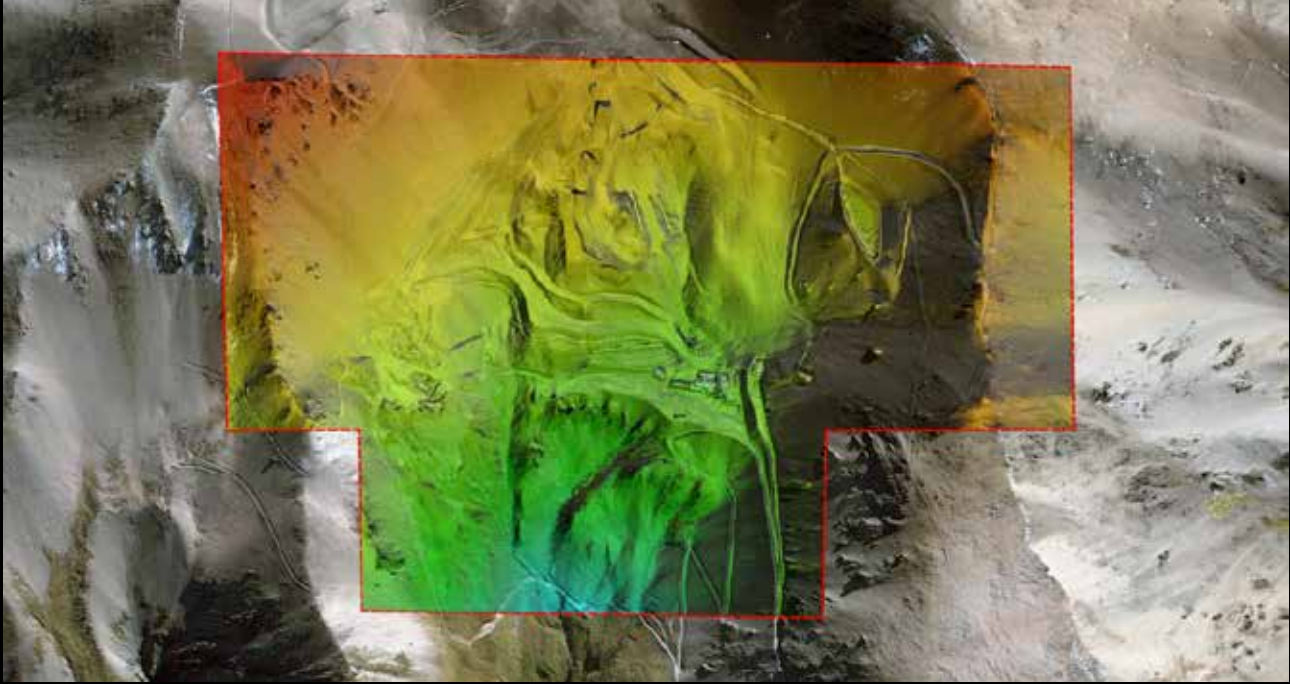
Side 60%
Forward 80%

New Zealand – Terrain model of a ski area

LIDAR - USE CASE

UAV TYPE: TRON

May 2019





Mt Hutt Ski Area

One week before snowfall Skybase received the order. For the preparation of the ski slopes a precise terrain model of the ski area was required. With the help of the Tron and the Yellow Scan Surveyor

Ultra LIDAR the terrain model was captured within 50 minutes flight time. The processed data and maps (point cloud, DTM, DSM, shape files) now helps the snow groomers to move the snow and build better terrain parks.


 80 m AGL | 262.5 ft

 5 m/s | 10.0 kn

 LIDAR Yellowscan Surveyor Ultra

 50 Min

 1° C | 34 F

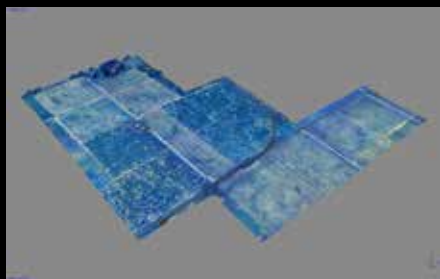
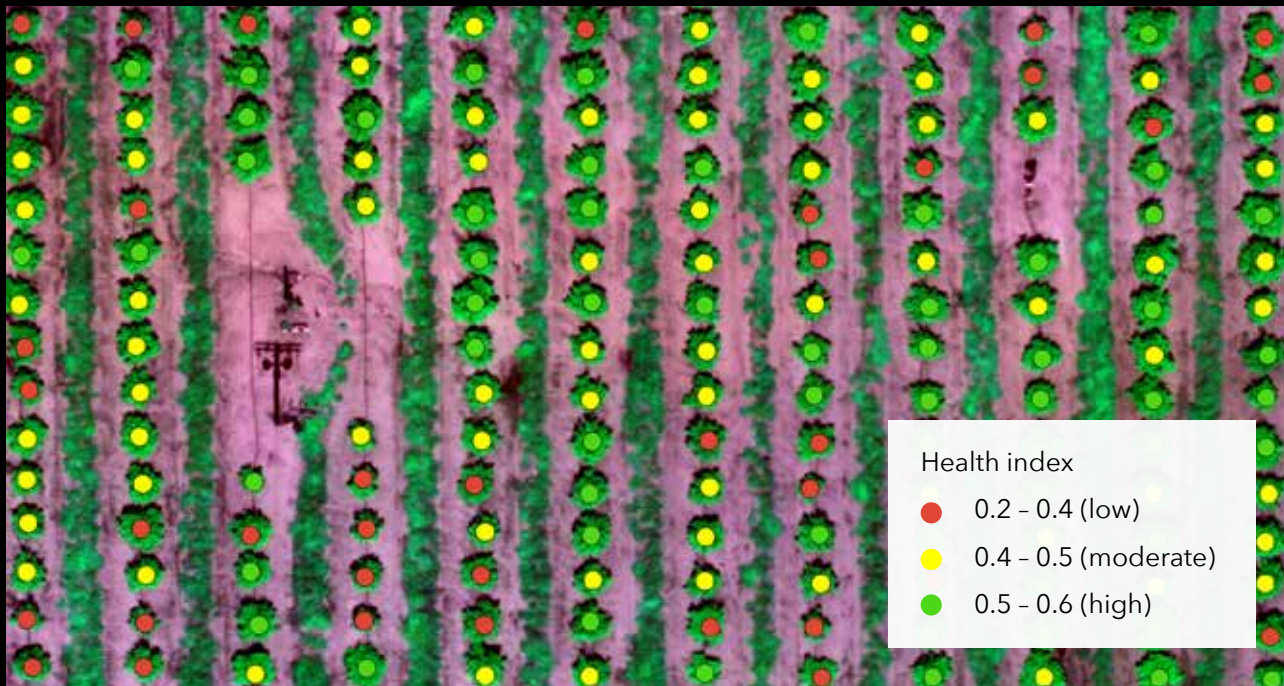
 2,2 km² | 220 ha

Florida - Health index of a citrus plantation

REDEGE-MX - USE CASE

UAV TYPE: TRINITY F90+

August 2019





Babson Park

Polk Drones is hired by a crop insurance provider for mapping citrus groves all over the state of Florida. Before the use of the Trinity F90+ they manually counted the trees with the help of a "clicker."

Polk Drones has automated the process and also provides tree health. With the Trinity F90+ they have flown 22.000 acres over the past 5 months. The groves are inspected every 5 years.

 80 m AGL | 262.5 ft


 3 - 5 m/s | 9.8 - 16.4 kn


 Micasense RedEdge-MX


 78 Min

 39° C | 102 F

 2024

 0,64 km² | 64 ha

 5,5 cm | 2.1 inch

 Side 80%
Forward 60%

Large coverage, high resolution

TRINITY F90+

Sony UMC-R10C

GSD	3.2 CM/PX
COVERAGE	700 HA
CAMERA	SONY UMC-R10C 20 MP RGB
ALTITUDE	120 M AGL



Gather more survey data in less time

With the Sony RX1R II (42 MP) or Sony UMC-RC10 (20 MP), the Trinity F90+ provides ideal payload configurations to efficiently map large landfills, gravel pits, open pit mines or construction sites in high resolution.

Together with its high PPK accuracy very precise data sets like orthomosaic photos, DTMs (terrain model), DSMs (surface model), stockpile volumes or excavation volumes can be created with the help of the Trinity F90+.



Sony RX1R II - Large area

GSD	3.2 CM/PX
COVERAGE	1050 HA
CAMERA	SONY RX1 RII 42 MP RGB
ALTITUDE	250 M AGL

Sony RX1R II - High resolution

GSD	1.55 CM/PX
COVERAGE	550 HA
CAMERA	SONY RX1 RII 42 MP RGB
ALTITUDE	120 M AGL



Intuitive Mission Planning

QBASE 3D



Using QBase3D is the way to pre-plan an aerial survey mission for Quantum-Systems UAVs.

QBase3D automatically generates efficient flight paths after the flight area and the mission parameters have been defined with a few clicks. You are in complete control over your photogrammetric aerial

survey mission and full coverage of your area of interest is guaranteed.

QBase3D provides real-time information such as altitude, speed, heading and battery status about the UAV and telemetry data about the mission that helps the pilot to stay up to date all the times.

3D planning for more safety

With integrated 3D view we offer an efficient tool to plan even more precisely and to keep a perfect overview during the flight. Intuitive and practical.

One Software - Many Application Scenarios

Quantum System UAVs combined with QBase3D help surveyors, farmers, scientists, quarrymen, civil engineers and geologists to focus on their application, allowing them to just fly!

Stay up to date

QBase3D is a constantly evolving product. Continuous system updates for all Quantum-Systems UAVs as well as Qbase3D itself guarantee maximum future security. During operation, live weather data supports mission planning.

Simple and fast

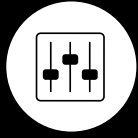
Thanks to QBase 3D all mission relevant steps from planning to flying can be carried out intuitively.

QBase 3D Features

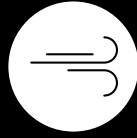


- Easy flight planning
- Corridor planning
- 3D Planning
- Live-Air-Traffic
- Resume mission
- Flight simulation
- Mission safety evaluation
- Flight data monitoring
- Battery monitoring
- ESRI Map Data
- Offline mode

THE WORKFLOW



MISSION
PREPARATION



UAV TAKE OFF



FLIGHT &
LANDING



DATA
PROCESSING

Mission preparation

Our QBase 3D is the core instrument to plan your mission in advance. Select your payload, the preset for data accuracy and define your mission area in only minutes. QBase 3D will calculate the mission including the necessary flight legs. The final mission check, integrated in QBase 3D, ensures that all parameters are correct.

UAV Take-off

Place your Quantum-Systems UAV according to the setup procedure. After connecting the battery and booting the UAV you can transfer the mission wirelessly to the autopilot. During the preflight check the autopilot will verify and approve the mission. The VTOL capability requires no additional equipment or interaction, just launch the system with the push of a single button.

Flight & Landing

While airborne, there is no pilot interaction necessary. If circumstances require you to alter the flight path (e.g. an evasive maneuver) you can do so by taking over manually - the drone will resume the mission afterwards.

QBase 3D always shows the UAVs telemetry data e.g. speed, position, state of battery charge to keep you up to date.

When landing, the drone will hover in 10 m (32.8 ft) above ground level and then initiate the landing process, which can always be controlled by the user.

Data processing

After landing, connect your PC to the UAV and download the fly logs via QBase 3D. With the help of this data it is possible to geotag the imagery files on the SD-card(s) within QBase 3D. The geotagged pictures are the basic framework for every data analysis with 3rd party programs.



UAVS made in Germany

QUANTUM-SYSTEMS



The Quantum-Systems team combines over 100 years of aviation and UAV engineering to bring the most advanced commercial VTOL drones to the world.

Quantum-Systems GmbH was founded in 2015 in Munich and is specialized in the development and production of automatic, electric vertical take-off and landing (eVTOL) fixed-wing drones for a wide variety of use cases. The 50+ employees (growing) are working intensively on combining range and electric efficiency with the ability to vertically take-off and land without additional equipment.

CEO Florian Seibel: "Our passion is the continuous development of industry leading VTOL aircrafts. With our ready to operate systems we serve a wide range of customers. We help to increase yields in agriculture, fly 3-D reconstruction missions, do tactical mapping for security forces or provide mission criti-

cal video footage in real time to military and security users. Made in Germany, non ITAR and no back doors in soft- or hardware as all of our flight planning and autopilot software is designed in house".

Unique feature - eVTOL fixed-wing system

The eVTOL fixed-wing UAVs of Quantum-Systems unite the benefits of helicopters and airplanes in one new innovative aircraft. This makes it a game changer as it combines both, the convenient handling of a helicopter and the efficient aerodynamics of an airplane into one system. Therefore, such systems can cover up to 100 times more area than regular multi-rotor drones and it is equally easy to control and operate them. No catapults, runways or landing nets needed.

UAVS made in Germany

COMPANY PROCESS



ORDERING PROCESS

TRINITY

- DAY 1-2** Order confirmation
(incl. final testing of all systems, extended preflight check & test flight)
- DAY 3** Shipment to customer**



MANUFACTURING PROCESS

TRON

- DAY 1-3** Order confirmation
- DAY 3-5** Contact with customer
- DAY 5-8** Procurement of additional parts as needed*
- DAY 8-15** Installation of payload, electronics calibration & final assembling
- DAY 15-18** Final testing of all systems, extended preflight check & test flight
- DAY 19-20** Preparing for shipping, customs declaration
- DAY 21** Shipment to customer**



TESTING

Our UAV's undergo the following quality tests before they are shipped



Flight testing (preflight check, hover flight, test mission, postflight check)



12-month warranty



Frequent individual quality inspections



SHIPPING

We can ship our UAVs worldwide. Our UAVs are shipped in unique transport cases adapted to the shape of the UAV. You can use it for transport and storage of the unit.



INDUSTRIES



Mapping



Mining



Inspection



Monitoring



Forestry



Industrial

* depending on procurement time

**depending on country and custom process



quantum
systems

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Bavaria