## Above and Beyond

A clever aerial survey tool, the Sirius Pro eliminates the need to set ground control points, saving you considerable time and expense. Quickly capture images with automated GNSS-RTK locations and time stamps for any area you select; equivalent to 1000 control points in the air.

Use these geo-referenced aerial images to create DEMs, orthophotos, basic measurements, overlays, 3D models, cut/fill analysis and even as-built design comparisons. You can rely on Topcon automation, RTK and wireless communications to see results quickly.

Typical application areas that benefit from using the Sirius Basic and Pro UAS include:

- Construction projects
- Mines and quarries
- Land survey and mapping
- Powerline and pipeline inspection
- Precision agriculture
- Sites without regard to terrain
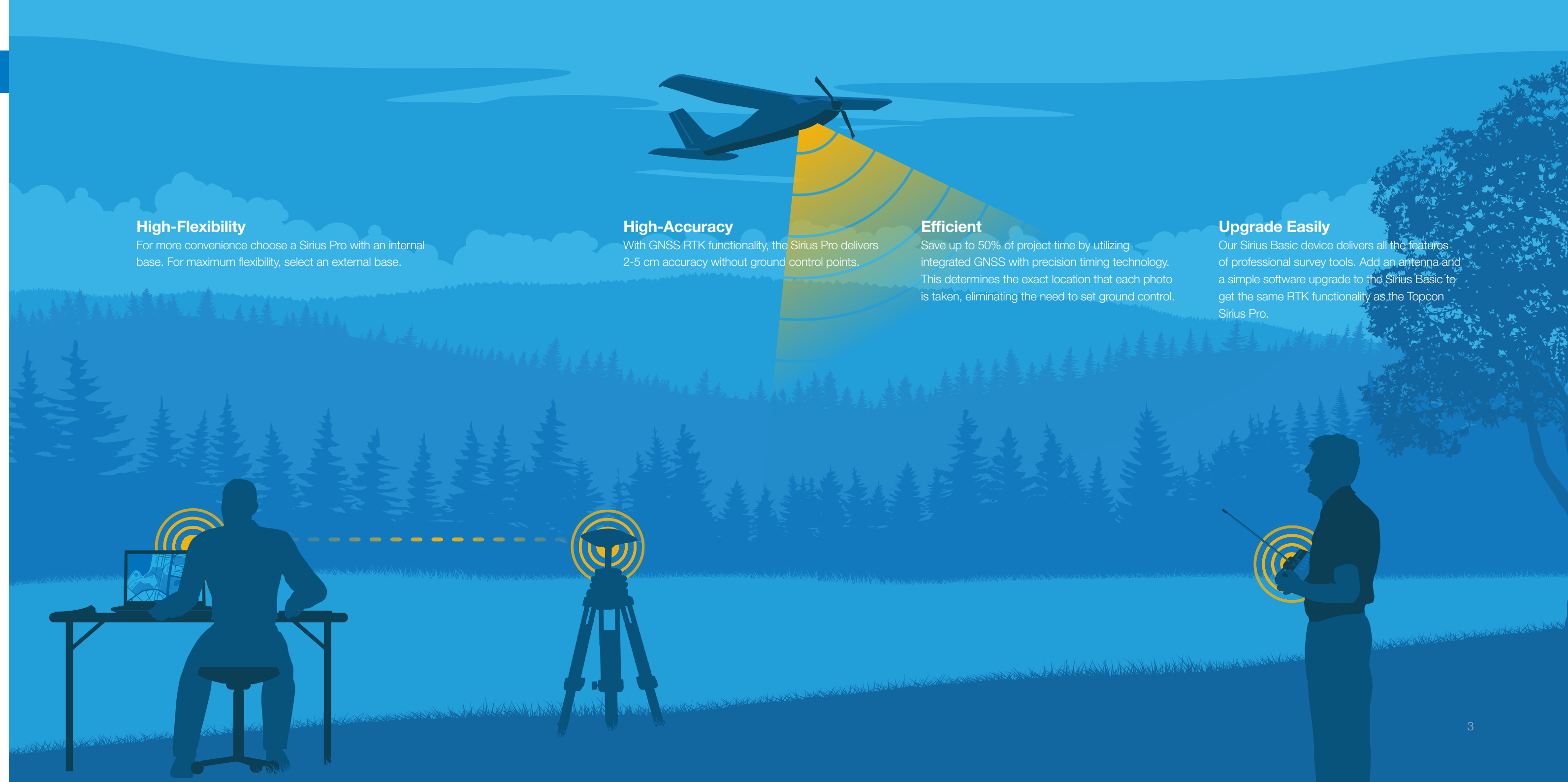
High-Flexibility
For more convenience choose a Sirius Pro with an internal base. For maximum flexibility, select an external base.

High-Accuracy
With GNSS RTK functionality, the Sirius Pro delivers 2-5 cm accuracy without ground control points.

Efficient
Save up to 50% of project time by utilizing integrated GNSS with precision timing technology. This determines the exact location that each photo is taken, eliminating the need to set ground control.

Upgrade Easily
Our Sirius Basic device delivers all the features of professional survey tools. Add an antenna and a simple software upgrade to the Sirius Basic to get the same RTK functionality as the Topcon Sirius Pro.

Aerial Mapping Solutions

The Sirius Pro delivers highly accurate aerial mapping results using GNSS-RTK, for 2-5 cm accuracy without ground control points (GCP). In traditional mapping, placing and measuring GCPs can take up half of an entire schedule. And without enough GCPs it can be difficult to get the accuracy your client needs.

In combination with precision timing technology, GNSS-RTK determines the exact location of each photo from the Sirius Pro, instead of GCPs.

With the entry-level Sirius Basic users get all the advantages of the Sirius Pro except GNSS-RTK, but a simple upgrade is possible at any time.
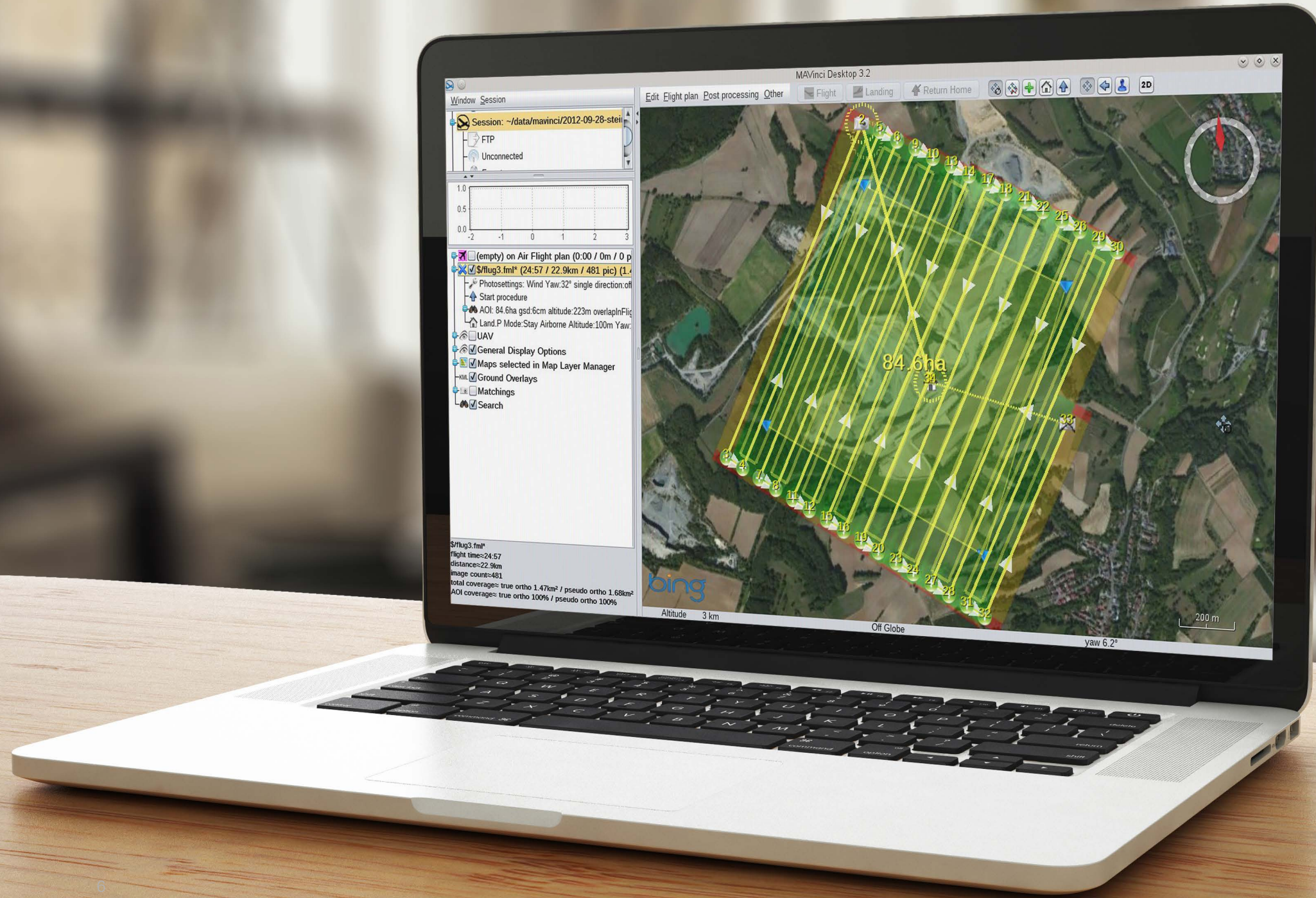
Flight Planning

With a Topcon Sirius and MAVinci Desktop software, flight planning couldn't be easier. Define an area of interest and desired Ground Sampling Distance (GSD). MAVinci Desktop automatically creates an optimized flight plan you can adjust mid-flight, while the UAS is still in the air. Advanced flight planning options are available for mountainous areas, and altitudes automatically adjusts as elevations change.

For automatic take off, launch the Topcon Sirius Pro by hand, no need for a catapult. During the completely automatic flight, the UAS follows a predetermined flight plan. If the coverage area requires more than one flight due to its size, flights are automatically divided to avoid gaps or overlap, and data is rejoined during post-processing.

Use of the Topcon Sirius Unmanned Aerial System (UAS) is subject to local rules and regulations governing UAS products in your country.
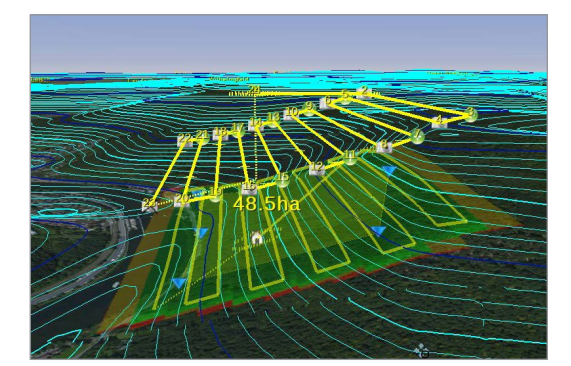
Imaging, Landing, and Data Export

The Topcon Sirius Pro and Basic capture aerial images with a 16 megapixel mirrorless camera and automatically store them on-board. The UAS can land automatically or manually with autopilot assistance, a good option in small or obstructed areas. The UAS is stabilized by autopilot and can be controlled manually with simple up/down and left/right commands.

After landing, photo log data (images with GPS positions and time stamps) are copied to MAVinci Desktop. Export images and data in one-click to your preferred post-processing software and generate DEMs, orthophotos, 3D models, 4D reconstruction, polygonal models and point clouds.

Sirius Gets the Job Done

As the first UAS with integrated GNSS-RTK, the Sirius Pro streamlines workflow by placing 1,000 equidistant RTK control points in the air. Eliminating the need for ground control points (GCPs) saves time and increases accuracy.

- Simplified, automatic flight planning
- Automatic operation from takeoff to landing
- Autopilot assisted manual control
- Safety and emergency actions
- Fully operational up to 50-65 km/h wind
- Accurate mapping without GCPs

Flight Planning
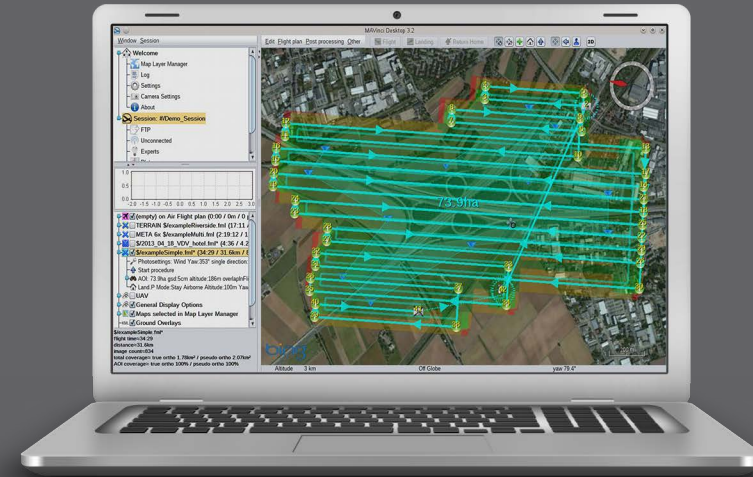
MAVinci Desktop

Flight planning with Topcon Sirius consists of finding the mission site, selecting an area of interest and setting the ground sampling distance. The plan is created automatically and transmitted directly.

- Session management
- Off-line mission planning
- Forecast of the ground coverage before flying
- Advanced flight planning for mountainous areas
- Multi-flight planning for optimized coverage of large areas
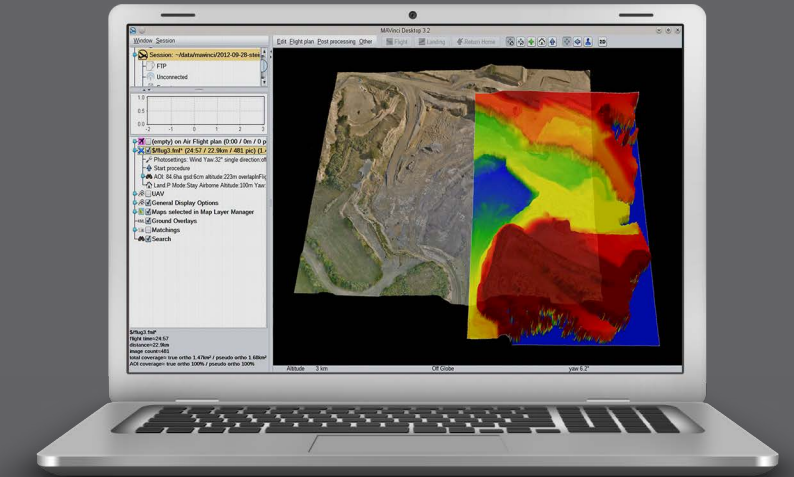
Image Acquisition

Sirius / Fujifilm X-M1

Typically, 1,400 photos are taken with a 3 cm GSD during a photogrammetric flight.

- Simple hand launch
- Automatic operation from take off to landing
- Autopilot assisted manual control
- Safety and emergency actions
- Low operation cost

Post Processing

MAVinci Desktop

Perform a rapid data check in the field to confirm coverage. After landing, photo log data is copied to MAVinci Desktop for post-processing.

- High-resolution orthophotos and DEMs
- One click interface to processing software

Planes and Cameras

By combining the same dual constellation GNSS receiver in Topcon surveying solutions with a 16 megapixel digital camera, the Topcon Sirius UAS delivers the ultimate in accuracy and efficiency. It's built of lightweight foam material with a folding propeller for easy transport to project sites.

Plan flights of up to 50 minutes long, and enjoy a long life cycle of up to 200 landings for each device. Flights can be made in almost any weather condition, including rain.

Fujifilm X-M1

Fujifilm X-M1 combined with a Fuji XF 18 mm f/2 R lens produces high optical resolution (16 megapixels) and low noise for crisp, beautiful images.

The focal length of the camera is fixed to increase post-processing quality, and you can quickly verify data on the spot.

Sirius Pro / Sirius Basic

- Advanced flight plans – automatically adapt to elevation models.
- Cover large areas – flight plan divides automatically and rejoins for post-processing.
- Cost efficient – more than 200 landings from one body, for low operation costs.
- Auto/assisted landing – in areas where automatic landing is impossible. The device is stabilized by autopilot and manually controlled with simple up/down, left/right commands.
- GNSS-RTK – L1/L2 GPS and GLONASS with RTK for highest accuracy and efficiency (Topcon Sirius Pro only).

- Excellent quality – best image quality and georeferenced accuracy.
- Weather conditions – operates in rain and temperatures of -20°C to 45°C.
- Fly in strong wind – up to 50 km/h (7B ft.) with gusts up to 65 km/h (8B ft.).
- Simple hand launch – no catapult necessary.
- Safety – get flight permission in many countries.
- Cruising speed – 65 km/h.

MAVinci Desktop

MAVinci Desktop software automates many UAS tasks and takes the leg work out of flight planning. Data coverage is checked automatically during flight planning, and large area flights are divided and rejoined in post-processing, which reduces overlap, time and costs.

Link to other software solutions in one click, and stay in your comfort zone.

Calculate flight plans automatically, simply choose an area of interest and ground sampling distance.

For large areas that can't be covered in one flight, the flight is divided and automatically rejoined before post-processing. Save flight plans for future use, or send them to the Topcon Sirius immediately.

Check ground coverage pre-flight with green, yellow and red indicators, and monitor flight status in 3D.

Preview an area of interest, monitor flights in real-time in complete 3D, and modify plans mid-flight. A quality check function verifies data in minutes while you're still on site, indicating sufficient overlap in green.

During flights MAVinci Desktop displays the status of the RC link state, GPS position and battery level. After flights and post-processing are complete, import DEMs and orthophotos as a basis for the next flight plan, or for basic measurements.

Customize display options including contour lines, compass, scale bar and control points. Modify environmental factors such as how the sun, sky and stars are displayed.
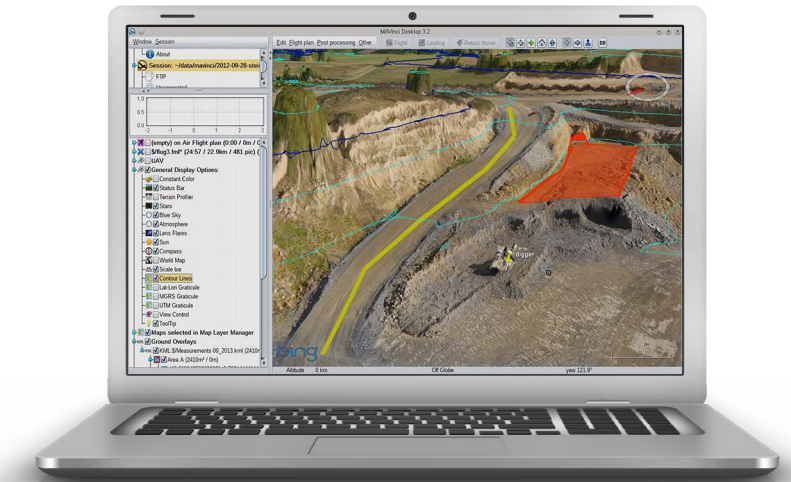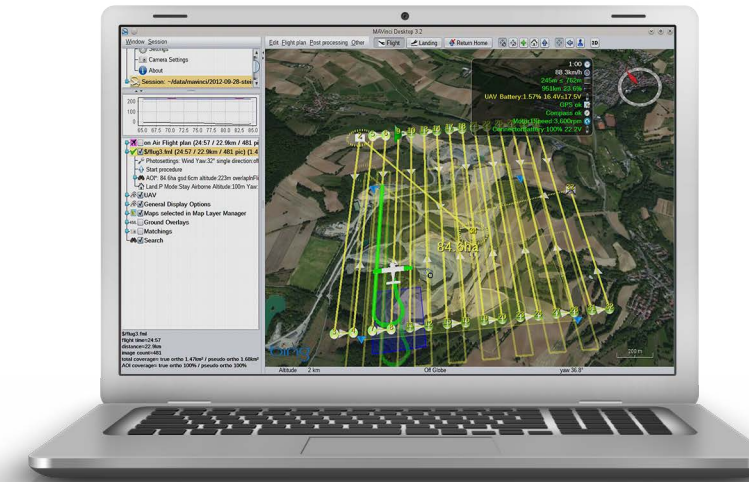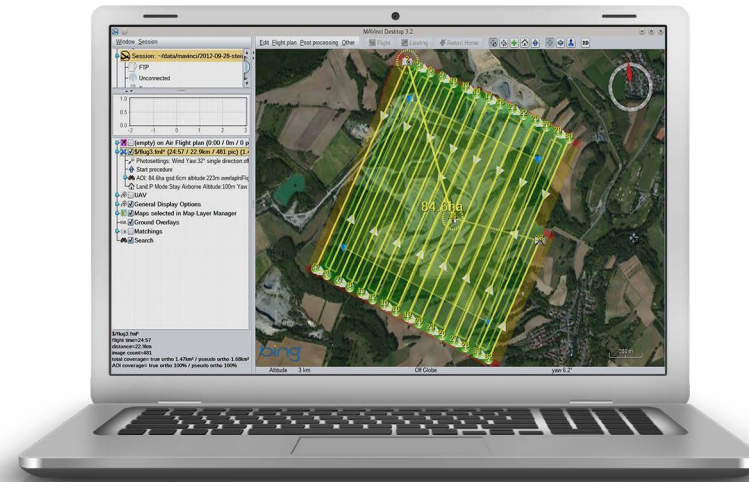
Image Acquisition

By definition, a UAS must be small and light yet capable of delivering high quality data at the same time. Topcon incorporates a Fujifilm X-M1 camera with 16 megapixel CMOS sensors, and Fujifilm XF 18 mm f/2 R lenses with a fixed focal length to increase post-processing quality. Calibrating the camera with the lens for even higher precision. An optional NIR camera is available for relative NDVI: a graphical indicator for analysis of vegetation conditions and photosynthetic capacity.

Coverage area for Sirius flights depends on the Ground Sampling Distance you set. One 45 minute flight covers the following areas:

GSD	AGL		Side / In-Flight Overlap	
			65 / 85%	20 / 80%
1.6 cm	60.3 m	198 ft.	0.643 km^2	1.54 km^2
2.6 cm	90 m	295 ft.	1.08 km^2	2.54 km^2
3.2 cm	121 m	397 ft.	1.35 km^2	3.15 km^2
5.0 cm	188 m	617 ft.	2.13 km^2	4.86 km^2
10 cm	377 m	1237 ft.	4.42 km^2	9.49 km^2
20 cm	753 m	2471 ft.	8.20 km^2	17.30 km^2

Kit Components

- Topcon Sirius UAS, powered by MAVinci, with MAVinci Autopilot System
- Camera kit
- Ground station
- MAVinci Desktop software
- Transport box for the UAS

Optional Accessories
- Base station kit (Sirius Pro only)
- Spare parts kit
- Training and support

* Laptop PC for field connectivity not included

1	Folding propeller (protection for landing)	8	Adaptive active cooling of autopilot electronics
2	Single battery-powered UAS	9	Security switch for engine control
3	Calibrated camera with large sensor	10	Extremely lightweight foam material
4	MAVinci autopilot	11	White color prevents overheating
5	Flashing lights below the wings	12	Access to camera storage card
6	Detachable tail rudders	13	Electric brush-less motor
7	Special long-life actuator	14	GNSS antenna

Safety and Specifications

To increase safety, the UAS performs emergency actions if necessary in the following conditions:

- In case of engine failure (e.g. low battery level): autopilot stabilizes the UAS altitude and descends.
- Send a "return home" command to bring the UAS back to the ground station.
- If GPS signal is lost the UAS will circle in waiting position.

Airframe Hardware	
Build Material	Elapor
Wingspan	163 cm
Length	120 cm
Weight	2.7 kg with camera
Battery	Lithium-polymer (18.5V, 30C, 5300 mAh)
Propulsion	Electric Brush-less 730W engine (Made in Germany)
Actuators	Long life

GNSS Component	
Number of Channels	226 Universal Channels
Signals Tracked	GPS L1 C/A, L2C, L2 P(Y) GLONASS L1/L2 Galileo E1
RTK Accuracy (Kinematic)	H: 10 mm + 1.0 ppm x baseline V: 15 mm + 1.0 ppm x baseline

Test Data Accuracy	GSD	X/Y	Z
Agricultural Area 1	1.6 cm	2.4 cm	3.1 cm
Stone Pit	2-3 cm	4.4 cm	0.8 cm
Agricultural Area 2	3.5 cm	5.1 cm	3.2 cm
Agricultural Area 3	10 cm	7.2 cm	8.6 cm

Flight Information	
Flight Time	Up to 50 minutes with camera
Orthophoto Flight Altitude	59 - 750 m
Max Flight Altitude	2600 m ASL
Operators	Single
Max Wind-speed Operation	50 km/h, gusts up to 65 km/h
Operating Temperatures	-20°C to 45°C
Rain Operation	Yes
Typical Cruise Speed	65 km/h

Radio Links	
EU / CE Regulations	2.4 GHz up to 2.5 km line-of-sight range
FCC / IC Regulations	2.4 GHz up to 6 km line-of-sight range (region dependent, auto configured)
All Countries RC	2.4 GHz for manual backup control up to 3 km

Camera (Fujifilm X-M1)	
Sensor	CMOS-Sensor APS-C
Resolution	4896 x 3624 pixels (16 megapixel)
Lens	XF 18 mm f/2 R
Lens System	8 elements in 7 groups (includes 2 aspherical elements)

Autopilot Security and Failsafe Features
Overheating prevention
Engine security button
Return home function
Multiple RC links
GPS tracker recovery (optional)
UAS fly-away protection
Emergency landing
UAS health data display on MAVinci Desktop

Autopilot	
Automatic Navigation	GPS/IMU aided, includes compass for improved navigation under strong winds
Flight Modes	Automatic / Autopilot supported / Full manual
Takeoff / Landing	Automatic

Landing	
Methods	Automatic / Autopilot supported / Full manual belly landing
Autopilot supported	UAS is controlled by simple up/down, left/right commands to avoid obstacles that prohibit automatic landing

With You All The Way

Our mission is simple - to help grow your business. Sure, that helps us grow ours, and together we can help ensure that a growing world is a healthy world. That's the Topcon vision and why more than 2,000 employees worldwide are dedicated to creating the technologies and bringing you the solutions to drive your success.

From our scientists in our state-of-the-art research labs to our solutions developers dedicated to understanding the challenges you face, we're focused on helping your business grow in efficiency and strength.
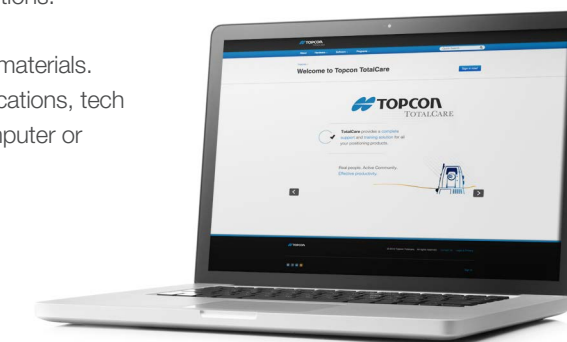
The world has a long to-do list. With 9 billion people expected on the planet by 2030, there's a lot of work to be done. We'll need more housing, roads and utilities. Topcon is driven to help you meet these demands with innovative solutions that help you work smarter and faster to create sustainable infrastructure. The innovative solutions and committed support from Topcon are all you need to build the future with confidence.

TotalCare

Topcon TotalCare is dedicated to helping you solve your workflow challenges, and get the most out of your Topcon solutions.

Get expert training from our large collection of online materials. Access software and firmware updates, current publications, tech tips, and guidance from the experts all from your computer or mobile device.

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