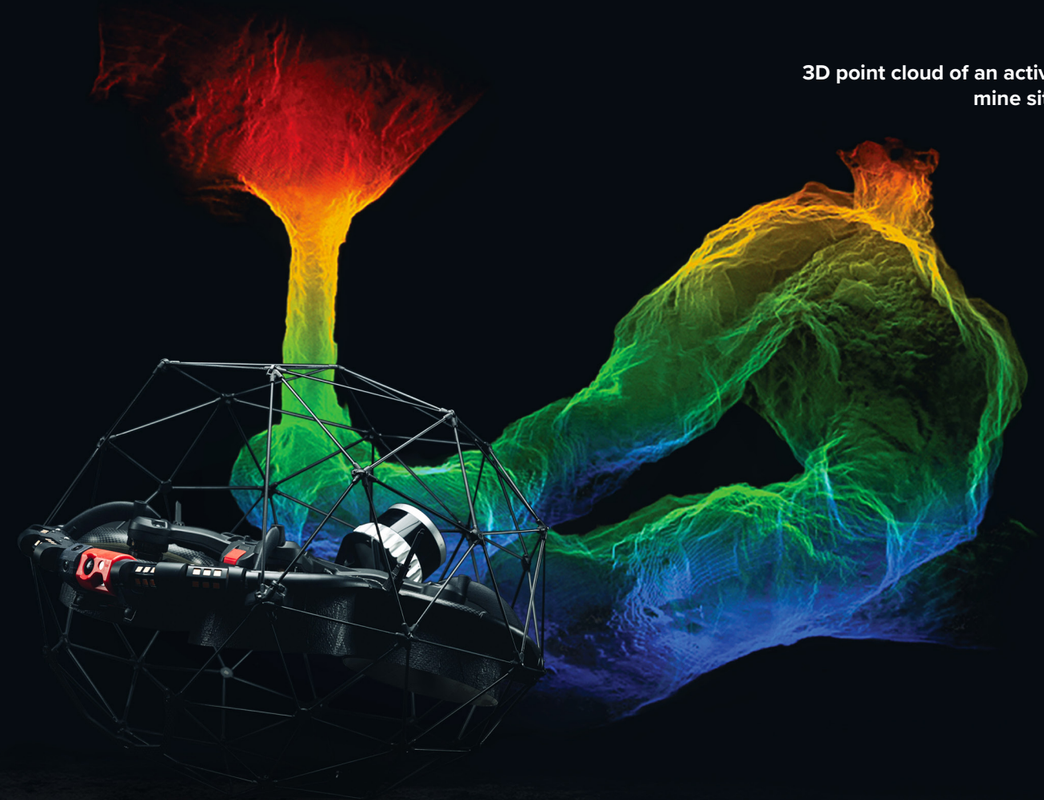
Elios 3 Surveying Payload

Surveying the inaccessible

Safely create centimeter accurate scans of hard-to-reach areas, with the Elios 3 Surveying Payload, the next revolution in 3D data capture by Flyability.

Patent Pending Technology

SWISS MADE



3D point cloud of an active mine site

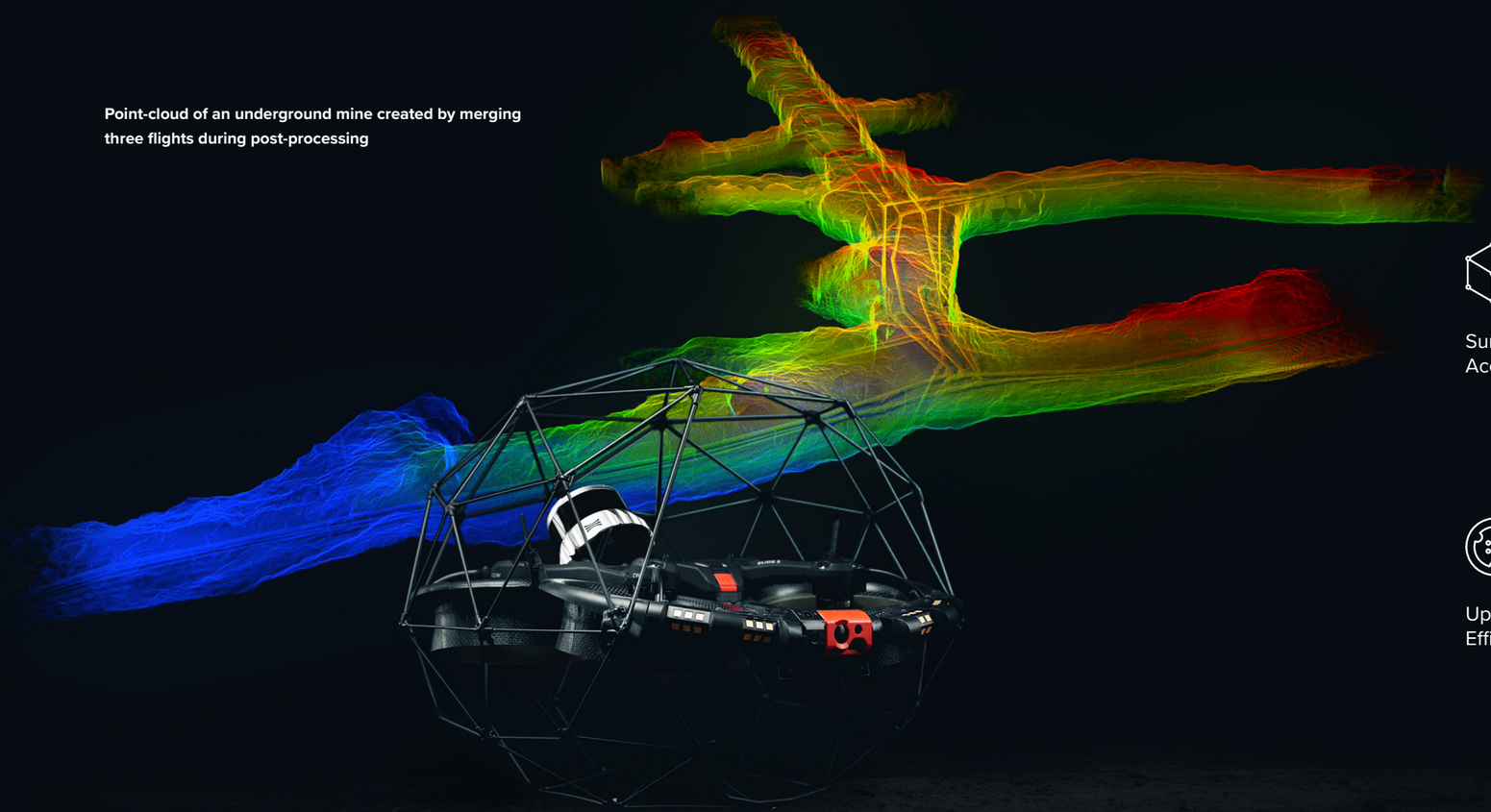
Bridging the gaps in challenging environments

Watch the video

Comprehensive data is key to supporting operational decisions. Yet many hazardous environments are beyond the reach of existing data capture technologies.

Flyability's New Surveying Payload turns the Elios3 into a flying mobile scanner that can fit through openings as small as 50x50 cm and create high resolution scans beyond the line of sight, allowing industry professionals to provide rapid insights that are not accessible with traditional tools or other UAV technologies.

Mission preparation at a depth of 1,200 meters below the surface



Point-cloud of an underground mine created by merging three flights during post-processing

Survey Grade Accuracy

New Mapping Opportunities

Stunning point clouds

Uplifted Mapping Efficiency

Scanning beyond safe access

Survey Grade Accuracy

The high resolution Ouster OS0-128 Rev 7 LiDAR sensor in combination with the world's leading FARO Connect SLAM algorithm create incredibly accurate 3D maps and digital twins of the most inaccessible spaces with centimeter precision - for accurate measurements and greater insights.

Accuracy

From 0.1% drift

Overlap of a Surveying Payload 3D point cloud with the ground truth used to assess the LiDAR accuracy

Unlock New Mapping Opportunities

Powered by the latest Ouster REV 7's supercharged L3 chip, the Elios 3 has the ability to capture points further apart and to detect more usable visual features. This maximizes the chance for the SLAM algorithm to converge when computing 3D models of cylindrical and symmetrical environments such as collectors, chimneys, culverts, or underground galleries[1].

> "The combination of long range, high point density, and increased photon sensitivity means the LiDAR can capture points further apart and "detect" more details. This significantly increases the chance for the SLAM algorithm to converge when computing 3D models in cylindrical and symmetrical environments."
>
> **- Michael Blake, Product Manager at Flyability**

Watch the ivideo

1. Accuracy may vary depending on the geometry of the mapping environment.

3D point cloud of a nominal symmetric environment

Stunning point clouds

Capture rich, detailed point clouds of the most complex indoors, operating from a safe location. With Elios 3's Surveying Payload you can effortlessly create comprehensive visual representations of challenging indoor spaces, allowing for precise mapping and analysis.

Precision at 1σ

+/- 6mm

Precision at 2σ

+/- 12mm

Photon sensitivity

10x

Real-world / point cloud data merging

Uplifted Mapping Efficiency

For all applications where centimeter accuracy matters, mobile scanning is far more effective than traditional methods such as total stations or terrestrial scanners. With a range of 100 meters, a point density of 1,310,720 pts/sec and a capacity to cover a 300 meter tunnel (close loop) in a single flight, the Elios 3 Surveying Payload can turn days of mapping into a 10-minute job.

Range

Up to 100m

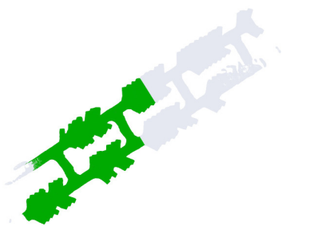
Scanning rate

1.3 M pts/sec

Surveying of a 340m tunnel in an underground mine

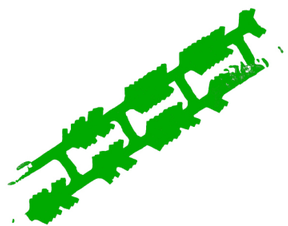
Terrestrial scan

Time: 18 minutes, Coverage: 15%



Elios 3 standard LiDAR configuration

Time: 18 minutes, Coverage: 50%



Elios 3 Surveying Payload

Time: 18 minutes, Coverage: 100%

Scanning Beyond Safe Access

With its small form factor, the Elios 3 and the Surveying Payload can fit through openings as small as 50x50cm. It has a fixed cage that physically protects the hardware and a patented combination of flight controller and motor design that allows the drone to recover flight stability after a collision. This enables the drone to navigate through the most complex environments to capture high-resolution scans where no other technology can.

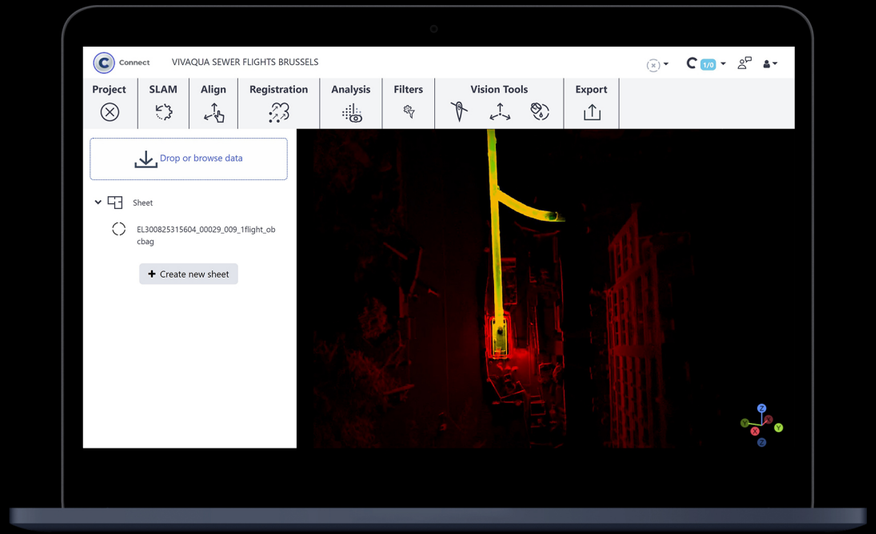
Elios 3 and the Surveying Payload at work in a sewer pipe

Create clean, georeferenced point clouds automatically

The Elios 3 Surveying Payload comes with the processing software FARO Connect. Together, Elios 3 and Faro Connect provide unrivaled survey-grade mapping abilities for challenging environments and offer an easy-to-use solution to help surveyors gain unprecedented analytical insights.

Data alignment Combine multiple point clouds to produce one single scan using reflective targets.	**Georeferencing** Automatically georeference point clouds using reflective targets.
Point cloud filtering Refine Elios 3 3D models with various filters including outlier removal, surface noise reduction, and removal of unwanted points.	**Easy export** Output the processed point cloud data to your required file type: LAZ, LAS, PLY, TXT, and E57.

FARO



FARO is a global market leader in 3D geospatial technology solutions and has been collaborating with Flyability for many years to provide surveyors with highly accurate 3D maps. Together, Elios 3 and Faro Connect provide users with a powerful surveying tool for every situation.

01. Capture

Elios 3 Surveying Payload

Collect LiDAR data during each flight and produce *.bag and *.JSON files

02. Process

FlyAware

Generate real-time *.las files using only the latest data sample in relation to the accumulated data.

For situational awareness, data localization, and drone stability

FARO Connect

Create a optimised *.laz file in post-processing using the entire dataset with loop closure techniques.

For high accuracy, georeferencing, and geospatial analysis.

03. View & Analize

- Cockpit Live Map
- Inspector

- FARO Connect
- Cloud Compare
- GeoSLAM Volume
- GeoSLAM Draw
- Bentley
- Deswit
- Revit
- AutoCAD
- Trimble
- ...

Elios 3 LiDAR configurations

	Elios 3 & FlyAware[1] When data localization matters	**Elios 3 Surveying & FARO Connect**[2] When the 3D model matters
Point clouds		
Range	1x Up to 50m @80% reflectivity Up to 15m @10% reflectivity	2x - 2.3x Up to 100m @80% reflectivity Up to 35m @10% reflectivity
Precision (2σ)	1x +/- 1.8cm	1.5x +/- 1.2cm

1. FlyAware is Flyability's SLAM engine, used in both Elios 3's piloting app and Inspector 4.0
2. FARO Connect is FARO's 3D mapping software designed for the seamless processing and management of Elios 3's LiDAR data.

	Elios 3 & FlyAware When data localization matters	**Elios 3 Surveying & FARO Connect** When the 3D model matters
Accuracy	Some artifacts, like "wall collapses" or "double walls"	No artifact as long as mapping guidelines are followed
• in structured environments	1x 2 - 5% drift	5 - 10x ~0.1% - 0.2% drift
• in nominal symmetric environments (>2m diameter, enough geometrical features)	1x ~2% drift	5 - 10x ~0.25 - 0.5% drift
• in challenging symmetric environments (>2m diameter, little geometrical features)	1x 2 - 5% drift	2-5x 0.5 - 2% drift
• in very challenging symmetric environments (<2m diameter, enough geometrical features)	1x 5+% drift	1-2x 2-5% drift
Points / sec	1x ~50k	25x ~1.3M
Light sensitivity	1x	10x
Mapping algorithm	Real-time SLAM focused on robustness, running on drone	Post-processing SLAM, focused on high accuracy, on desktop PC
Software	Inspector (for reporting and data localization)	Inspector + FARO Connect (for georeferencing, 3D manip. , etc)

Surveying package

A one-stop solution.

To get you started, the Surveying Payload comes as a comprehensive package.

The hardware

The surveying payload comes as a package with the Elios 3 drone or as a standalone payload for existing Elios 3 users.

The FARO Connect software

This software is meant to ease the processing and management of Elios 3's LiDAR data.

A set of reflective targets

Perfectly sized for FARO Connect to automatically detect in the SLAM registration workflow.

An in-depth training course

Covering everything from best flight practices to processing and registration.

This package is designed to maximize your field experience and accelerate your operational proficiency.

TECHNICAL SPECIFICATIONS

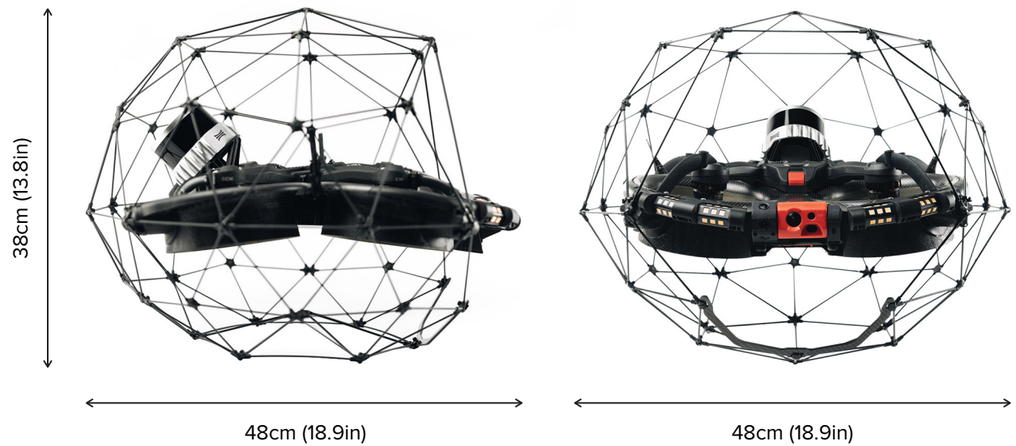
SURVEYING PAYLOAD

Index

AIRCRAFT WITH SURVEYING PAYLOAD MOUNTED

MODIFICATION FROM NOMINAL SPECIFICATIONS

Weight	2465g +/-15g 5,45lbs +/- 0.53oz
Flight time[1]	9 minutes
Operating temperature[2]	0° C to 48° C 32° F to 118° F
Operating altitude[3]	Min: -3000m, Max: +2700m AMSL Min: -9850ft, Max: +8850ft AMSL
Data transfer time	6 minutes[4] for a full time flight including LiDAR data



1. In ideal flight conditions, with a new battery
2. Valid for batteries pre-condition between 10°C and 40°C; 50 °F to 104 °F
3. Additional payloads will further degrade this performance
4. When using USB3.0 cable and USB3.0 port on the computer running Inspector

LIDAR PAYLOAD

Accuracy	From 0.1% drift
Precision	1σ +/- 6mm 2σ +/- 12mm
Range	Up to 100m
Scanning rate	1,310,720 pts/sec
Photon sensitivity	10x
LiDAR configuration	Ouster OS0 128 beams REV 7 sensor[1]
Handheld scanning time[2]	10 minutes

1. Specifications for the OSO 128 beams REV 7 sensor are provided by Ouster. Complete specifications of the sensor are available on Ouster's website.
2. With 50°C ambient temperature and having the drone preconditioned beforehand at 20°C room temperature or with 40°C ambient temperature without preconditioning

SOFTWARE

Minimum requirements	• Windows 10 • Intel i7 6th Generation OR AMD Ryzen 7 (1700X) • Integrated Graphics • 64GB RAM • 30GB free space • SATA SSD memory
Suggested requirements	• Window 10 • Intel i7, i9 8th Generation or greater OR AMD Ryzen 7 (2700X) • NVIDIA GTX 1060 • 128GB RAM • 30GB free space • M.2 PCIe memory

Flyability

About Flyability

Flyability is a Swiss company building solutions for the inspection and exploration of indoor, inaccessible, and confined spaces. By allowing drones to be used safely inside buildings, it enables industrial companies and inspection professionals to reduce downtime, inspection costs, and risks to workers. With hundreds of customers in over 50 countries in Power Generation, Oil & Gas, Chemicals, Maritime, Infrastructures & Utilities, and Public Safety, Flyability has pioneered and continues to lead the innovation in the commercial indoor drone space.

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FARO Technologies

About FARO Technologies

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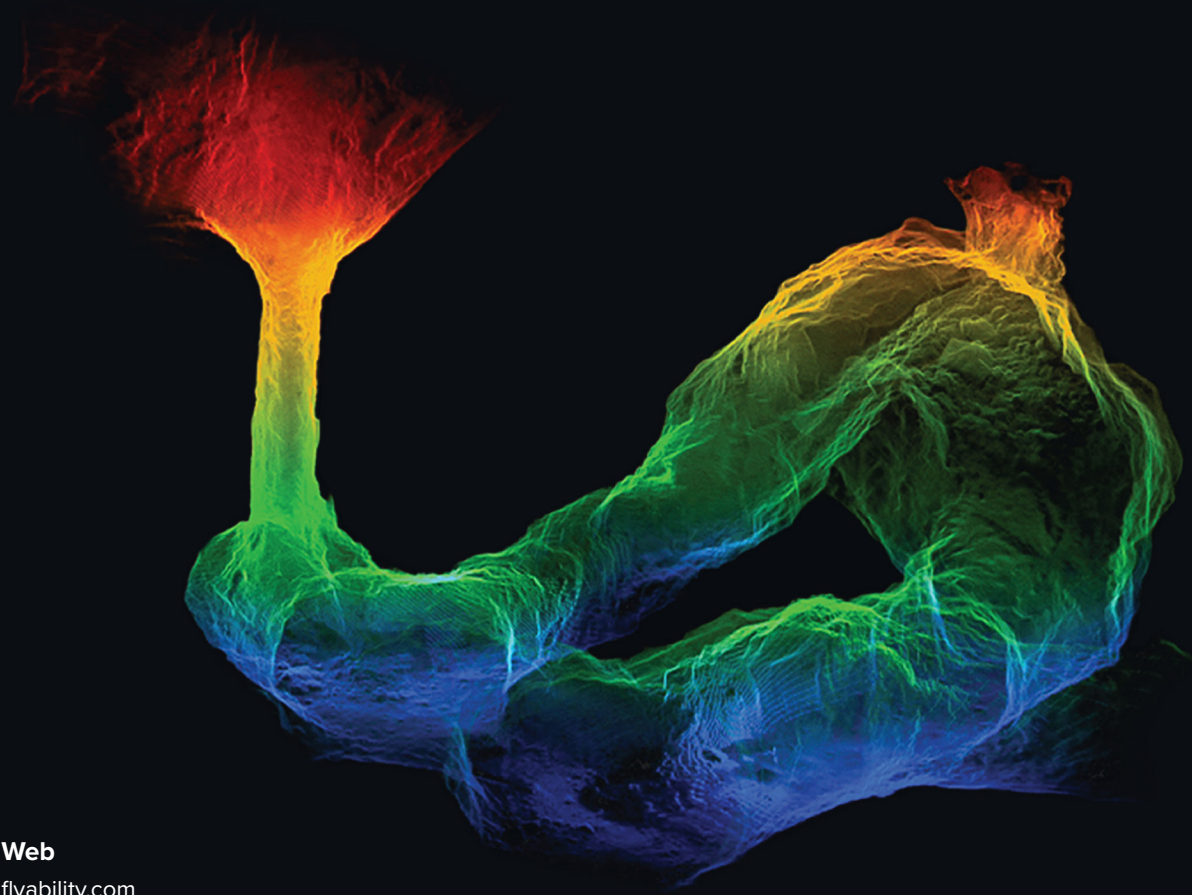

Web

flyability.com