FLYABILITY

SAFE DRONES
FOR INACCESSIBLE PLACES

ELIOS3 - Digitizing the inaccessible



Adam Mari
Sales Representative

UAVA CZECH REPUBLIC

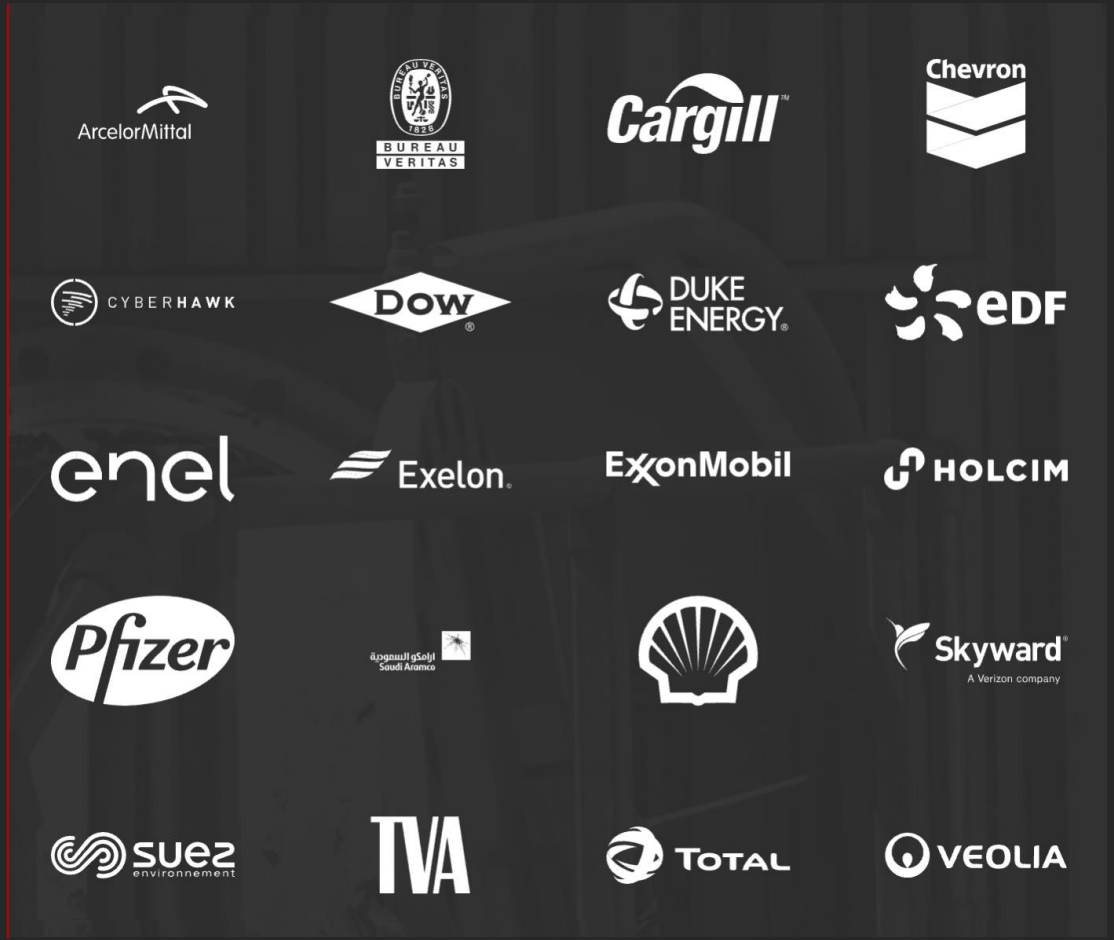
September 13th 2022

FLYABILITY

116+ employees
900+ customers
70+ resellers
2,000+ drones sold
100,000+ flights

They're trusting our products for their visual inspection work

- Private industrial companies
- Government agencies
- Inspection companies
- Robotics service companies



INDUSTRIES USING ELIOS DRONES











OIL & GAS

E.g. Chimney, Smokestack, Offshore RIGS, FPSOs, Drilling Ships, Oil Tanker, Storage Tanks, Refineries, Jetty

POWER GENERATION

E.g. Coal Power Boilers, Nuclear Plants, Heat Recovery Steam Generator, Waste Incinerator, Wind Turbines, Hydro Power Plant, Recovery Boilers

CHEMICALS

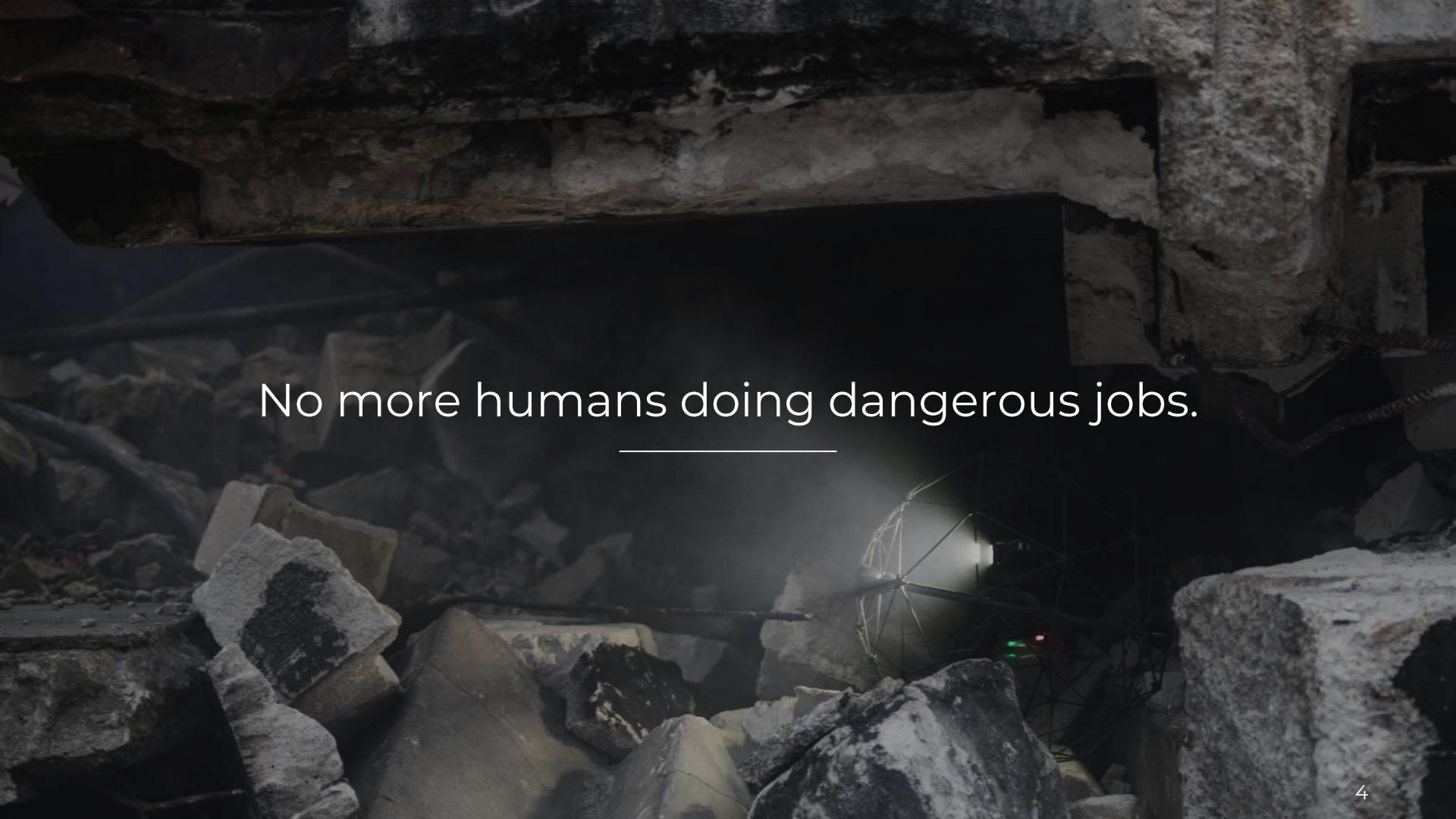
E.g. Pipe Racks, Cables, Conduits, Fermenter Tanks, Fiberglass Storage Tanks, Pressure Vessels, Storage Tanks, Suction Ducts, Heat Exchangers, Storage Silos and Bins

MINING

E.g. Open Stope, Drop Raise, Conveyor Belt, SAG Mills, Ball Mills, Grinding Mills, Stockpile Feeders, Crushers

PUBLIC SAFETY

E.g. Special Forces, Coast Guards, Search and Rescue, Firefighters


No more humans doing dangerous jobs.

Take the guesswork out of maintenance operations in a safe, fast, and economical Way

IMPROVE SAFETY

Avoid confined spaces entry and work at height during visual inspections.

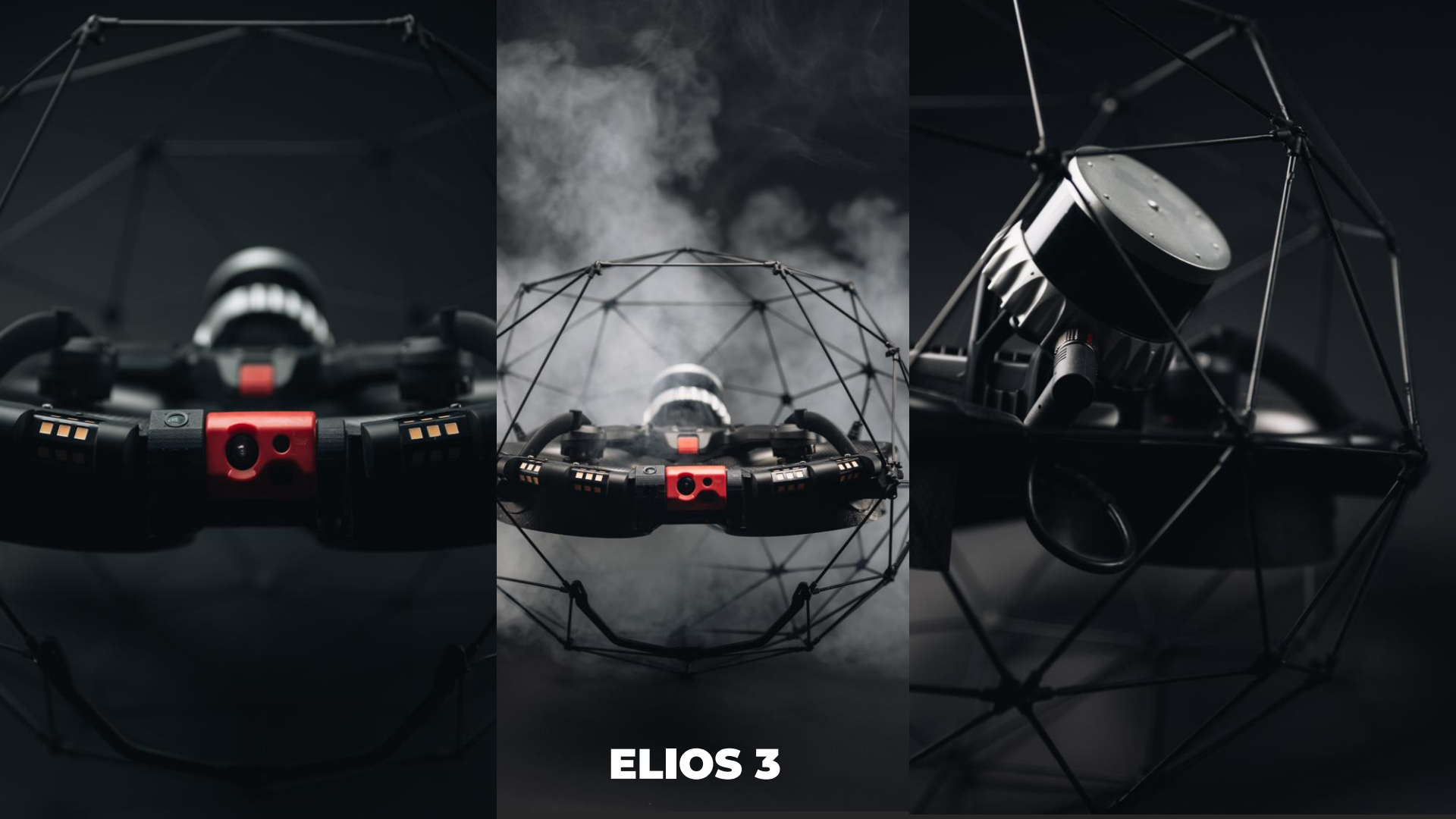
REDUCE DOWNTIMES

Turn days of asset downtime into hours.

LOWER COST

Save your financial resources for where they're really necessary.




ELIOS 3

From a pioneer of drone-enabled inspection to a global industrial leader.



Elios 1

The 1st collision-tolerant indoor drone.

Unleashes the potential of UAVs to inspect inaccessible places from a safe distance.



Elios 2

The most intuitive and reliable indoor drone.

Enables flawless inspections of industrial assets right from the first flight using cutting edge data capture capabilities



Elios 3

The 1st inspection, mapping & surveying indoor drone

Opens doors to automation and verticalization through an unmatched combination of intelligence, stability, and versatility.

THE FUTURE

Fully autonomous inspections with a **range of payloads** addressing industry specific needs.

2014 2015 2016 2017 2018 2019 2020 2021 2022

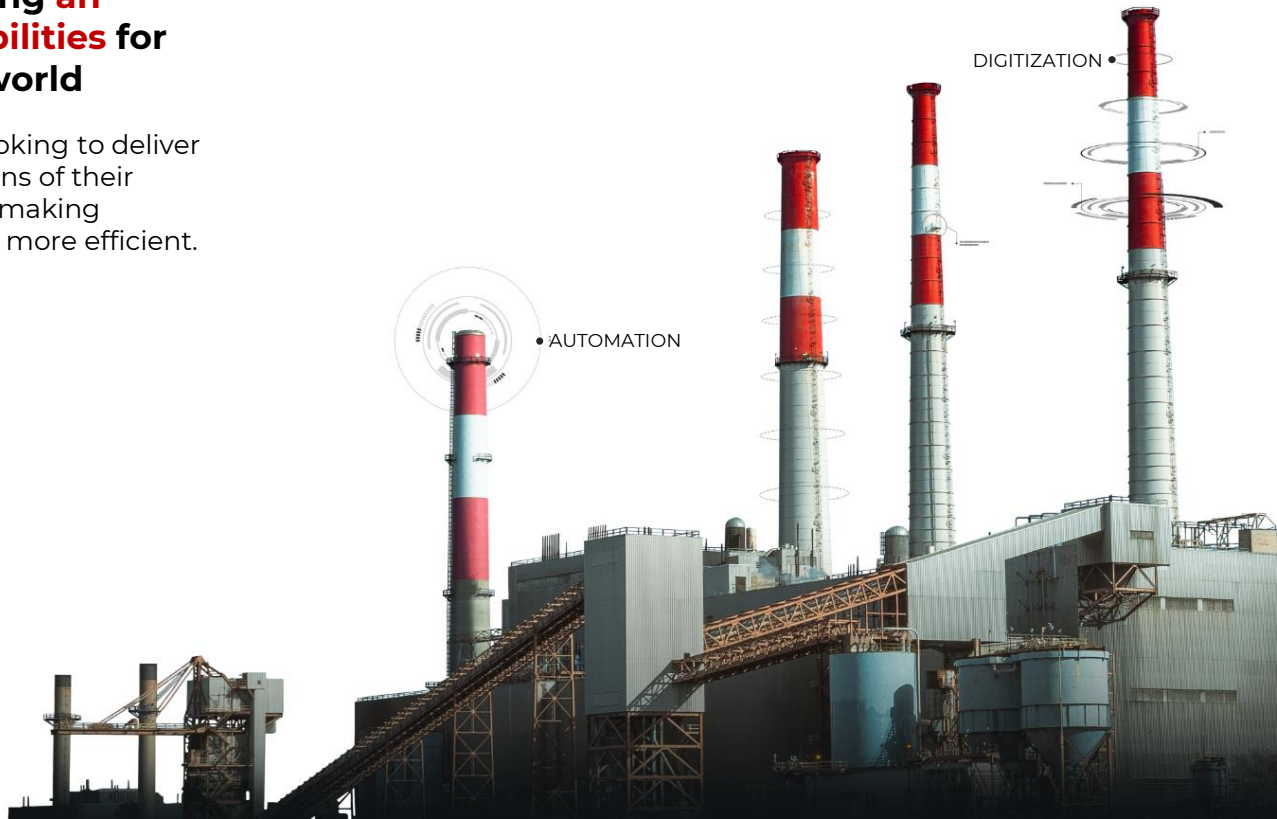
MARKET BREAKTHROUGH | INDUSTRIALIZATION | COMMODITIZATION & SPECIALIZATION

INDUSTRY 4.0

Digital is opening an ocean of possibilities for the industrial world

Organizations are looking to deliver digital transformations of their industrial processes making operations safer and more efficient.

2022



Much more than a flying camera,
Elios 3 is a powerful data-harvesting tool.



FlyAware™
SLAM Engine

SLAM-Based
Stabilization

3D
Live Map

3D
reporting

3D Surveying
Solution

Modular
Payload Bay

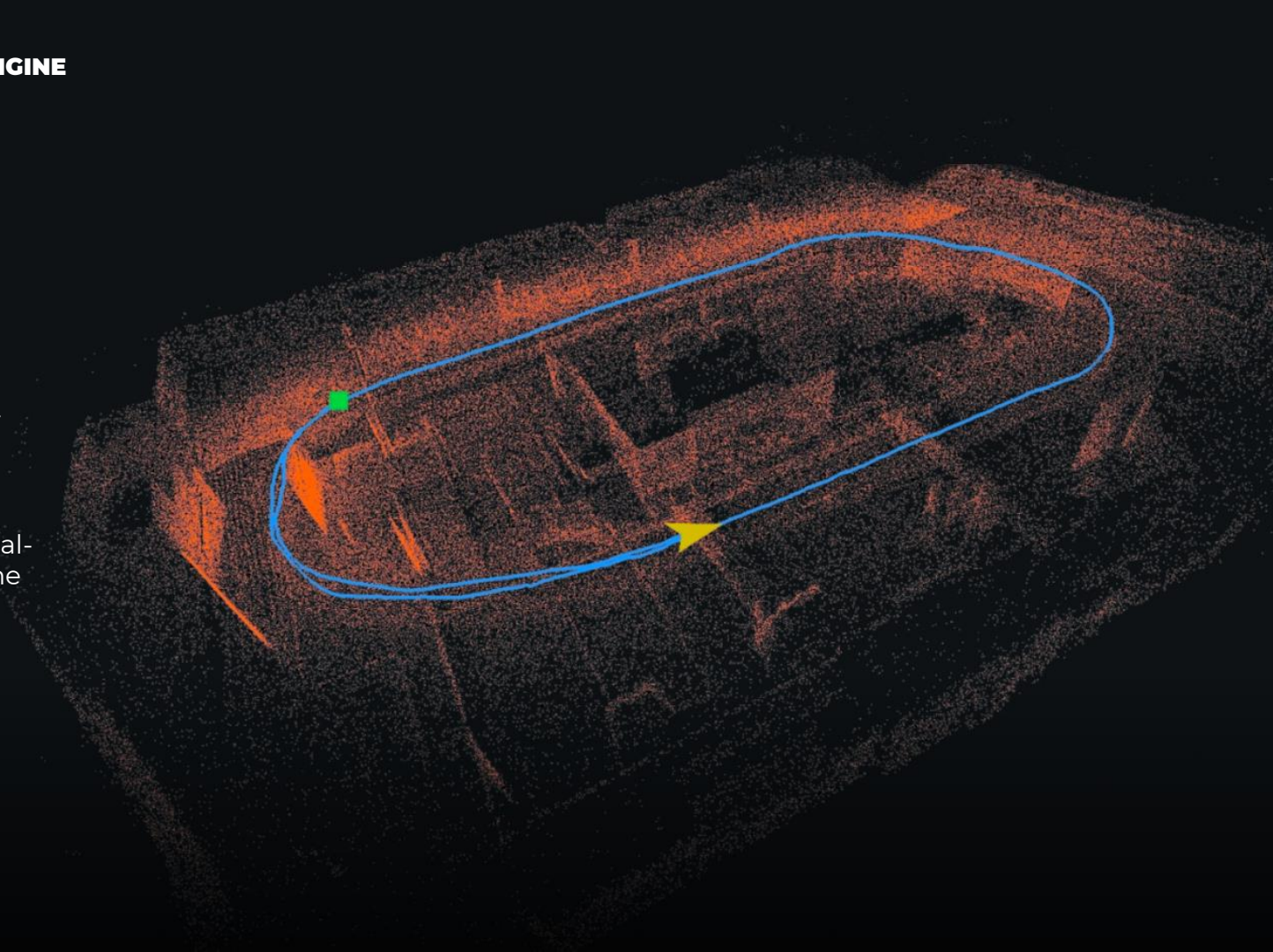
Collision-Resilient
Rugged Design

Close-Up Inspection
Dedicated Payload

Extended
Air-Time

Powered by FlyAware™.

FlyAware™ is the unique combination of computer vision, LiDAR technology, and a powerful NVidia graphic engine. Acting as an indoor GPS, it builds real-time 3D maps enabling the drone to sense its surroundings instantaneously.



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SLAM-BASED STABILIZATION

Stone-still stability. No matter the conditions.

The all-new SLAM-based stabilization algorithm catches the tiniest unpredictable movements of the drone and instructs the flight controller to compensate for it. This allows for the drone to float in the air still as a stone even in the toughest conditions.





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3D LIVE MAP

Flawless locational awareness.

The Elios 3's embedded LiDAR scans the surroundings to build a high-density point cloud map. This map is displayed instantly in the Cockpit App, empowering pilots with exceptional locational awareness.



Always know where you are.

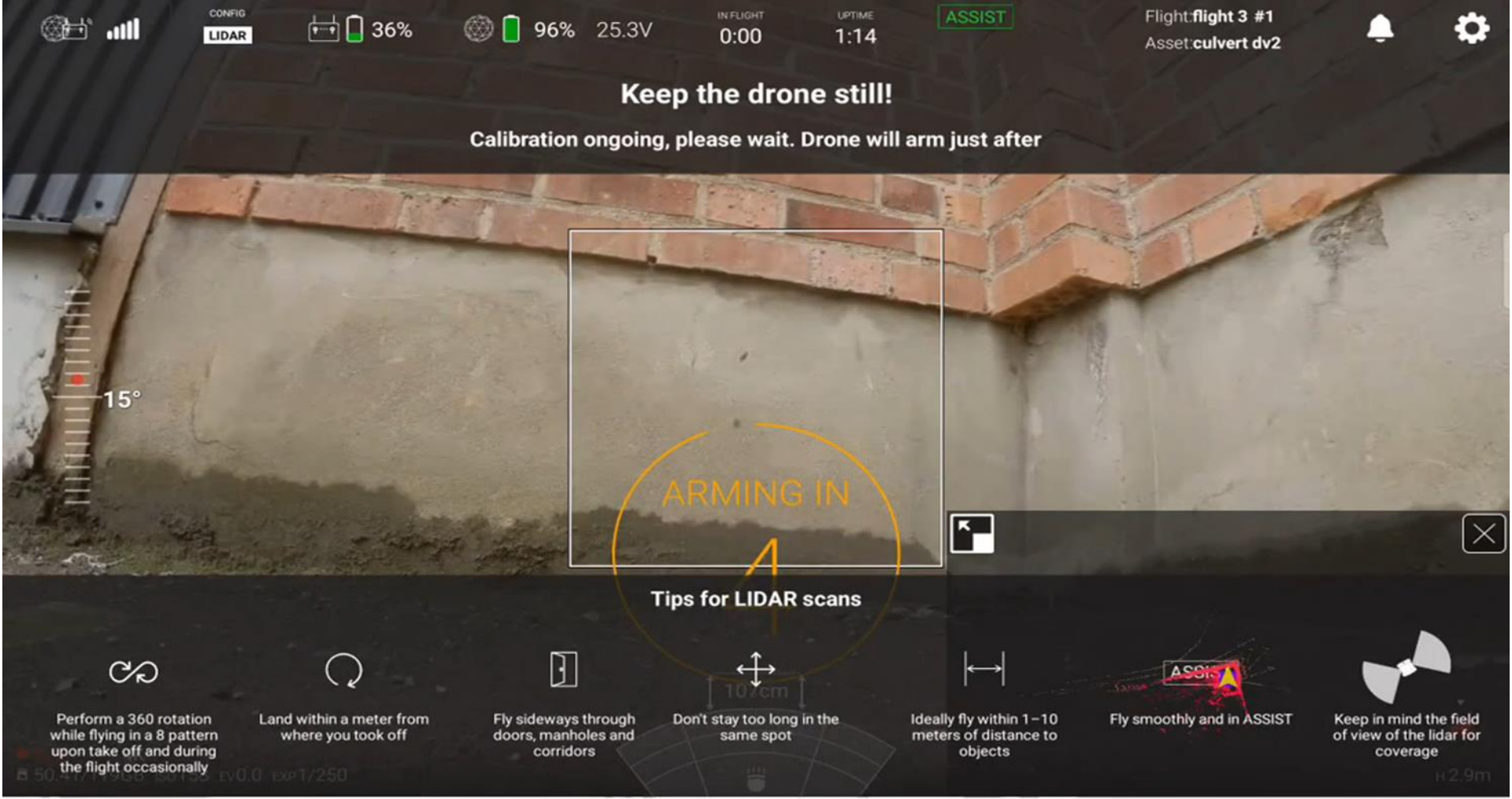
The drone's position is located precisely so the pilot can easily decide on the optimal route to safely return home.

Assess inspection coverage.

Cumulative mapping data shows the completeness of the map so you can instantly assess your inspection coverage.


s26 b15.96m r-73
s25 b17.32m r-78
CONFIG
LIDAR
53%
Log: EL300858804493_00523_195_1flight
76%
23.4V
IN FLIGHT
1:16
UPTIME
5:12
ASSIST
FLIGHT
Flight:lukas #1
Asset:t3stroom
Issue with VIO camera
29°
M: 8cm
4K
53.08/59GB ISO2202 EV0.0 EXP1/50
H 20.5m


s27 b15.06m r32%
s26 b15.83m r30%
75% 23.0V
100%
IN FLIGHT
2:10
UPTIME
5:12
MODE
ASSIST
Flight #1
EL3858804493
00081
026
ARMED
TOP
SIDE
RESET
Camera
Free | Follow
Motor communication issue
0°
Points
549904
M: 40cm
Map slice
Z
CLEAR
0:00 4K
58.04/59GB ISO1438 EV0.0 EXP1/50
D 0.0m H -6.6m


CONFIG
LIDAR
36%
96%
25.3V
IN FLIGHT
0:00
UPTIME
1:14
ASSIST
Flight:flight 3 #1
Asset:culvert dv2
Keep the drone still!
Calibration ongoing, please wait. Drone will arm just after
15°
ARMING IN
Tips for LIDAR scans
Perform a 360 rotation while flying in a 8 pattern upon take off and during the flight occasionally
Land within a meter from where you took off
Fly sideways through doors, manholes and corridors
Don't stay too long in the same spot
Ideally fly within 1–10 meters of distance to objects
Fly smoothly and in ASSIST
Keep in mind the field of view of the lidar for coverage

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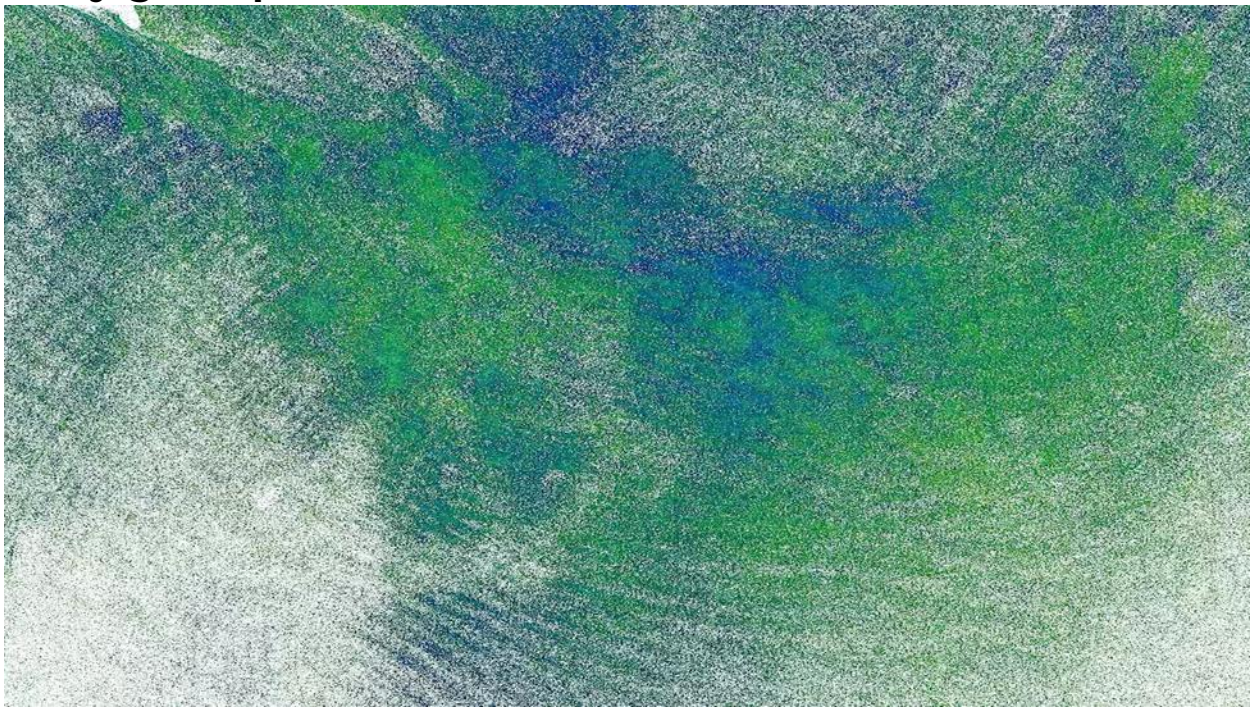
Modular
Payload Bay

Collision-Resilient
Rugged Design

Close-Up Inspection
Dedicated Payload

Extended
Air-Time

Survey-grade point clouds.



Thanks to an integration with GeoSLAM Connect’s software suite, Elios 3’s LiDAR data can be processed to build survey-grade 3D models of your asset enabling surveyors to map the truly inaccessible.

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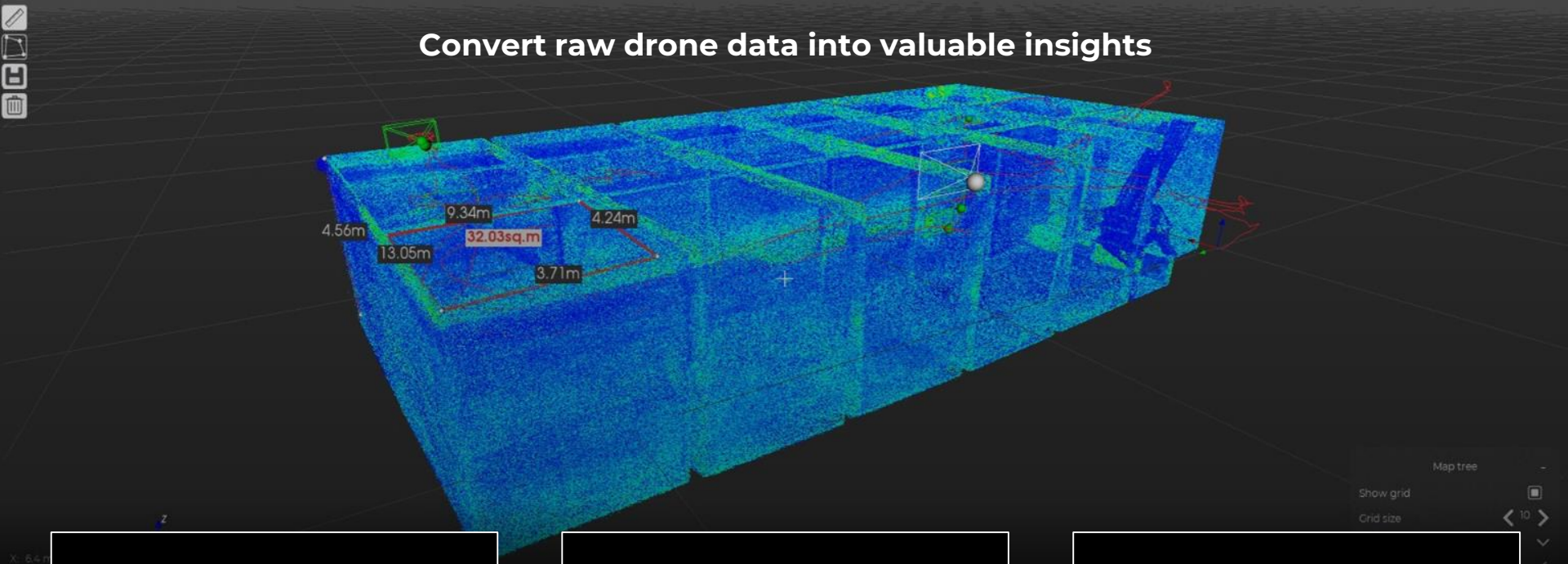
INSPECTOR 4.0



Make sense of your inspection data.

Visualize, localize, and document your inspections with Inspector 4.0. An easy-to-use software solution developed to allow asset operators to make fast, data-driven decisions.

Convert raw drone data into valuable insights



One seamless workflow

From data capture to decision making, Inspector 4.0 and Elios 3 work hand-in-hand to provide operational continuity boosting your efficiency.

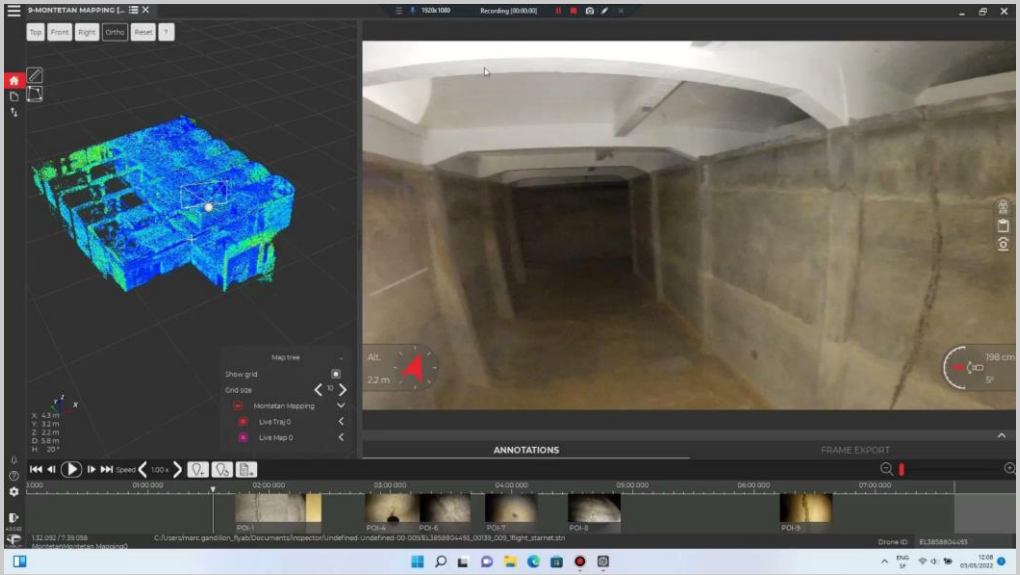
Accurate data

Thanks to Elios 3's LiDAR sensor, inspection data is now reported on a high density point cloud of your asset offering a whole new level of data accuracy.

Instant localization

Whether captured in flight or tagged during data analysis, points of interest show instantly on the 3D model with no additional processing.

Unlock the power of drone-based inspections



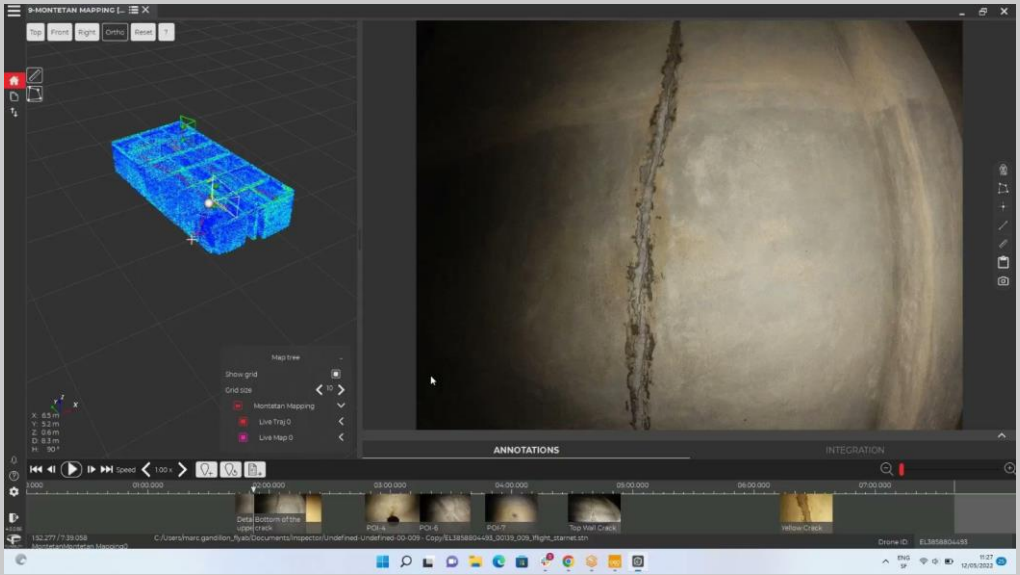
Visualize Data on a 3D Map.

Navigate through the 3D model using the pan, rotate, and zoom functionalities.

Click on a point of interest to see the corresponding frame in your mission video.

Demo

Unlock the power of drone-based inspections



Analyze Point of Interests.

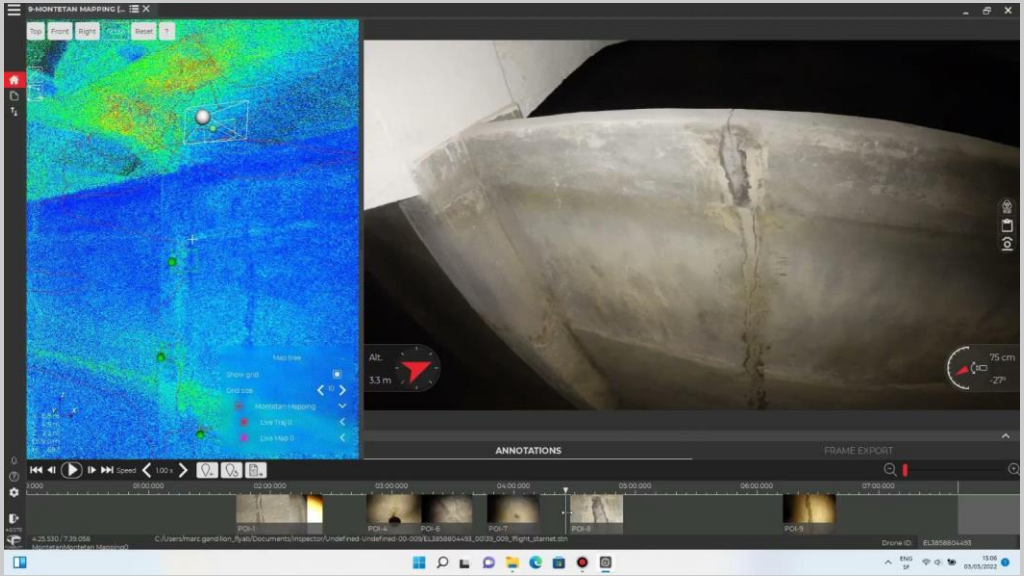
Select the frame that best shows your point of interest.

Enhance its tiniest visual features by zooming in and adjusting light and contrasts.

Acquire its dimensions using the 2D measurement tool.

Demo

Unlock the power of drone-based inspections



Document and organize.

Report your findings directly in the video player.

Give your point of interest a name and a description.

Classify them by criticality and organize them with custom tags.

Demo

Unlock the power of drone-based inspections



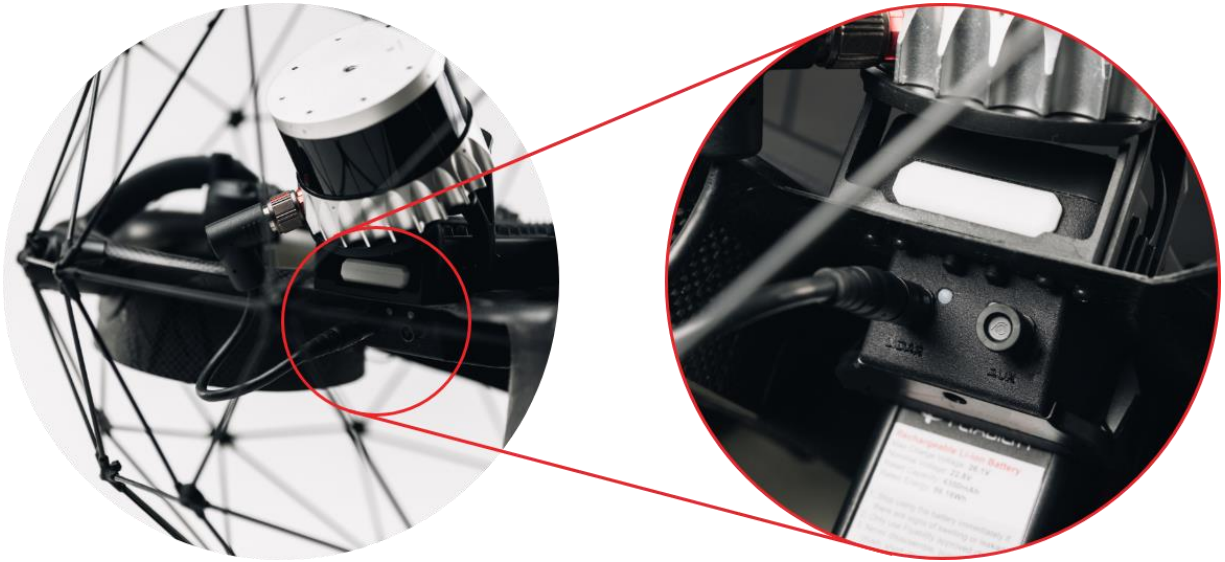
Share formatted reports.

Export your analysis and POI information into a PDF or Word document.

Share it easily among your organization or with your clients.

Demo

MODULAR PAYLOAD BAY



A versatile and future-proof inspection tool.

The modular payload bay features two ports: one dedicated to the LiDAR and one for auxiliary payloads. This unique integrated design provides aerial capabilities for a range of upcoming indoor applications.

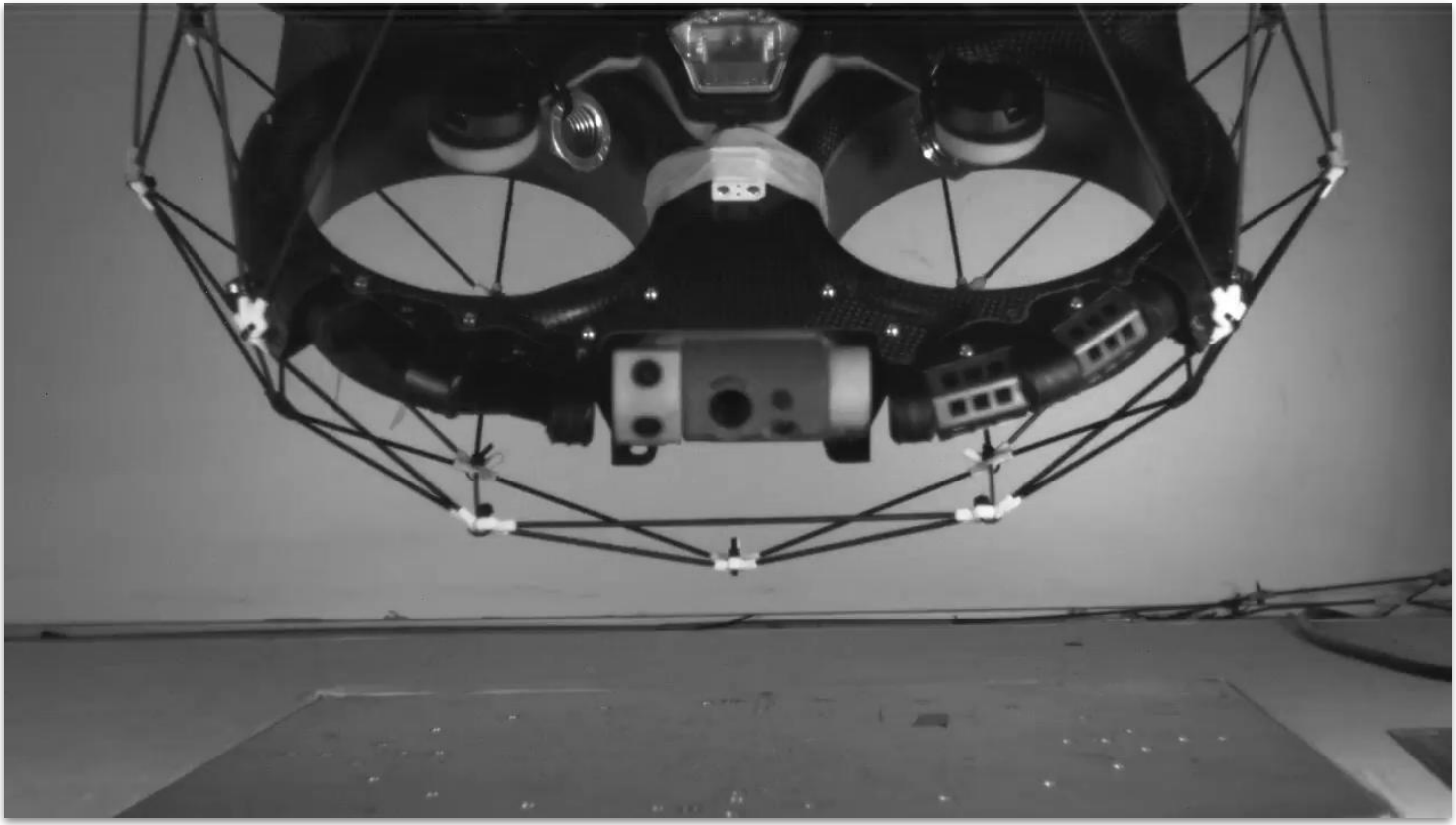
Much more than a flying camera,
Elios 3 is a powerful data-harvesting tool.



- FlyAware™ SLAM Engine
- SLAM-Based Stabilization
- 3D Live Map
- 3D reporting
- 3D Surveying Solution
- Modular Payload Bay
- Collision-Resilient Rugged Design
- Close-Up Inspection Dedicated Payload
- Extended Air-Time

COLLISION-RESILIENT RUGGED DESIGN

Ready for the tough work.



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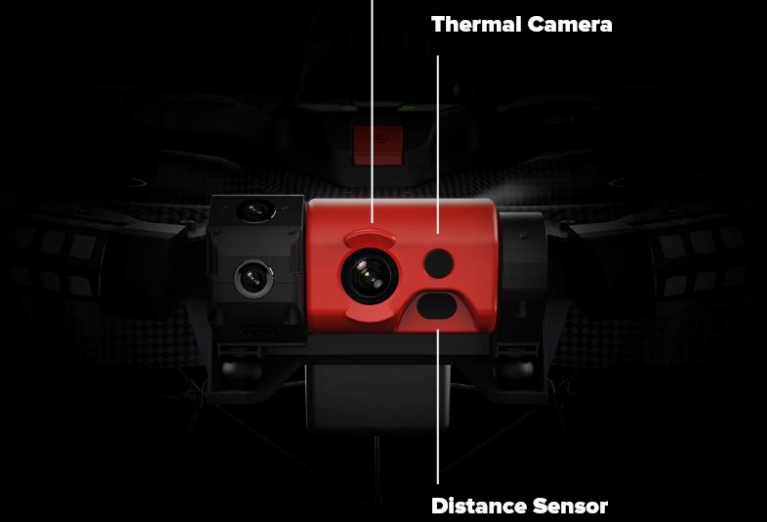
CLOSE-UP INSPECTION DEDICATED PAYLOAD

Supercharging data quality.

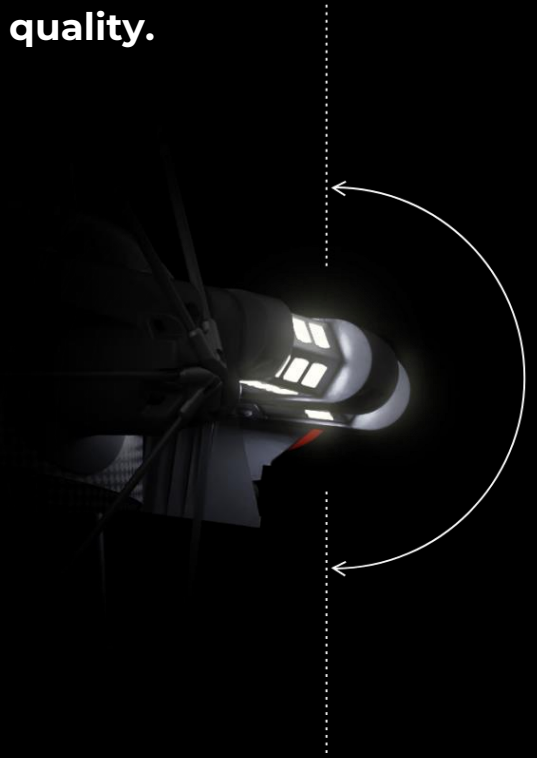
4K Camera

0.18 mm/px resolution

Thermal Camera



Distance Sensor



Unobstructed 180° FoV



Oblique lighting
Detect pittings, cracks or build-ups



Dust-Proof 16k Lumen Lighting

Looking for pitting, cracks, or build-ups becomes as natural as doing it manually with a flashlight


DEMO
Dust-Proof Lighting

Much more than a flying camera,
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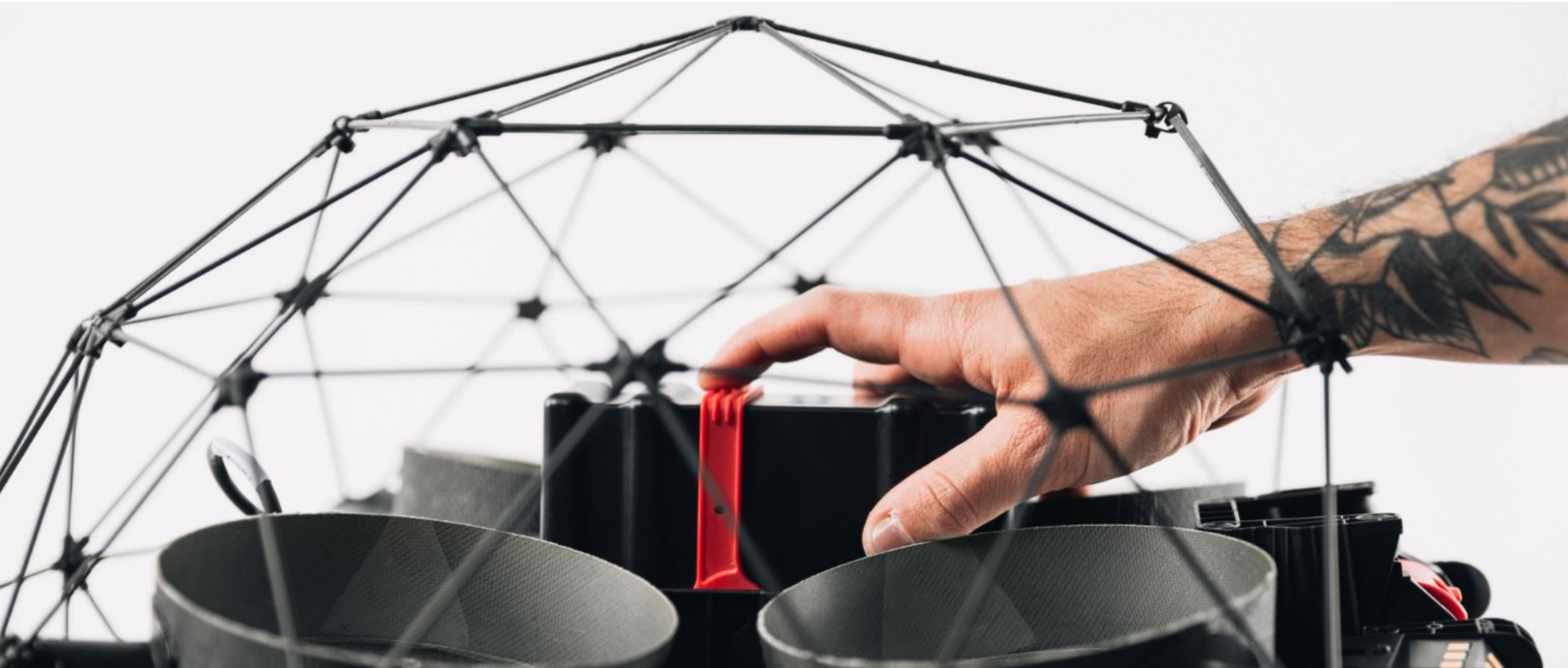
Collision-Resilient
Rugged Design

Close-Up Inspection
Dedicated Payload

Extended
Air-Time

EXTENDED AIR-TIME

With a new insert & lock mechanism battery manipulations are easier than ever.

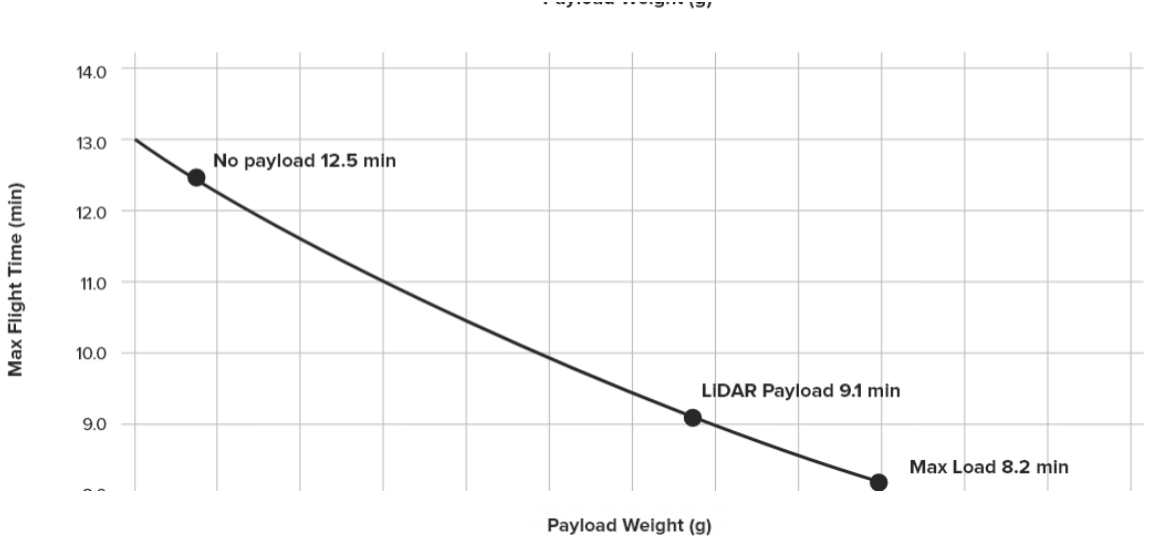




Do it all in one go.

The Elios 3 offers up to 12.5 minutes of flight time* so you can go the extra mile in every single flight. With a new insert & lock mechanism battery manipulations are easier than ever.

**Flight time without a payload mounted on the payload bay.*



These companies are using Elios 3



"The stability in [dusty] cyclones was an 'AHA!' moment. It's amazing. Makes a big difference."
Jorge Gamarra, Global Digital Maintenance Group Expert

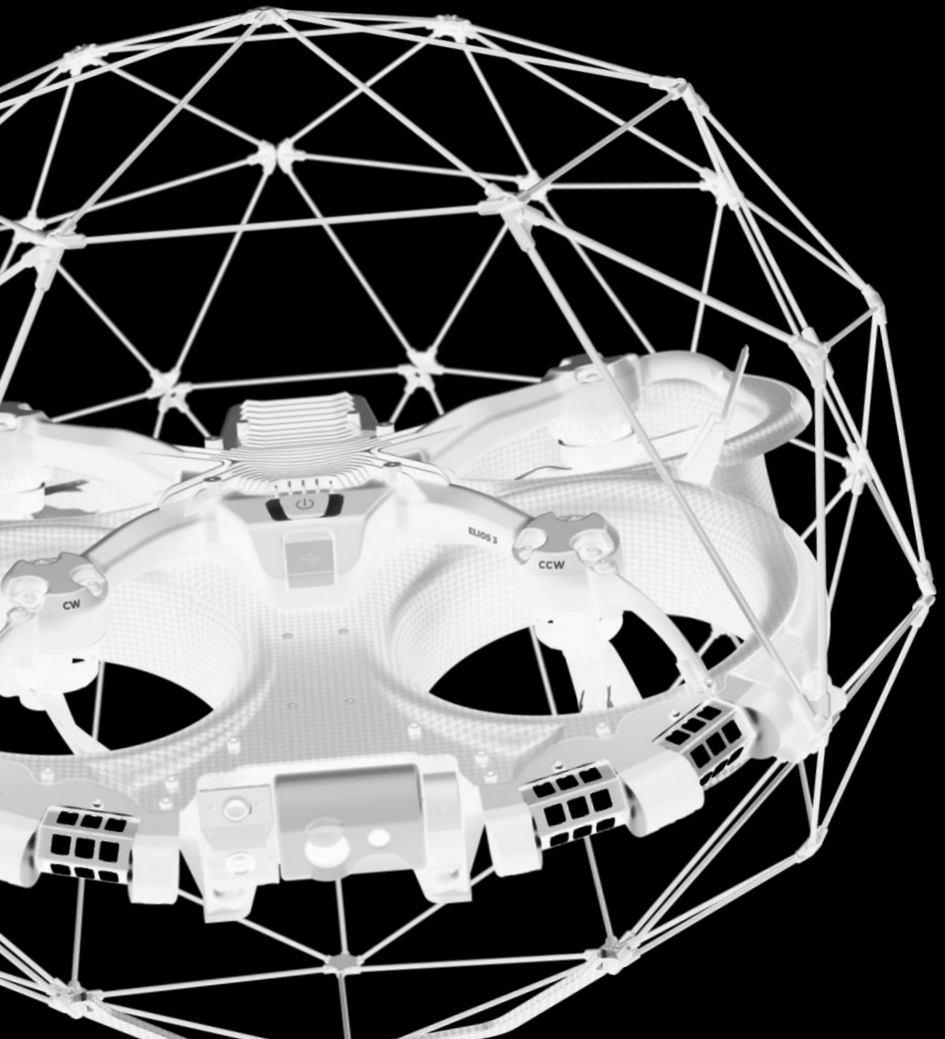
"Order of magnitude change from E1 to E2, and now again from E2 to E3! Can truly scale the use of drones at Chevron by getting people who aren't experts to fly it."
Mauricio Calva, Nondestructive Examination Expert

"Game changing, 10x better than Elios 2, a drastic improvement! Stability means more people can fly it."
Calvin Rieb, Global, Remotely Operated Systems Leader

Which Elios do you need?

	Elios 2	Elios 3
Surveying	✗ -	✓+ **GeoSLAM Connect** +/- 2cm accuracy
Real time 3D live map	✗ -	✓+ **3D live map** displayed in cockpit app while flying for flawless situational awareness
Future-proof	✗ -	✓+ **Modular payload bay**
Mapping / 3D Modelling	✓ **Visual Inertial Odometry (VIO)** post-processing*	✓+ **LIDAR mapping** in flight
Live streaming	✓ **HD 1280 x 720p @ 30 FPS** with video rendered on an 8 inches screen.	✓+ **FHD 1920 x 1080p @ 30 FPS** with video rendered on an 11 inches screen.
Data output	✓ **Video, Pictures** 4K / HD @ 30fps, 12MP still images w/ 0.18 mm/px @ 30 cm distance	✓+ **Video, Pictures & 3D model** 4K / HD @ 30fps, 12MP still images w/ 0.18 mm/px @ 30 cm distance, LiDAR data (*.bag, *.las)
Ease of use, stability	✓ **Stable in 60% inspection scenario** Stabilization based on Time of Flight sensors and optic flow cameras	✓+ **Stable in 90% inspection scenario** Stabilization based on FlyAware SLAM algorithm using VIO cameras & LiDAR data
Data localization	✓ **Sparse 3D point cloud** through post-processing*	✓+ **High-density 3D point cloud** right after the flight without any additional processing
Lighting system	✓ Up to **10K** Lumen, Dust-proof lighting Oblique lighting	✓+ Up to **16K** Lumen, Dust-proof lighting Oblique lighting
Flight time	✓ **10 min.**	✓+ **12.5 min.** w/o LiDAR **9 min.** w/ LiDAR
Size	✓+ **38 cm x 38 cm (13.8 x 13.8 in)** in height and width	✓ **38cm (13.8 in) x 48cm (18.9 in)** in height and in width
Weight	✓+ **1450g (3,2 lbs)**	✓ **2350g (5,2 lbs)**

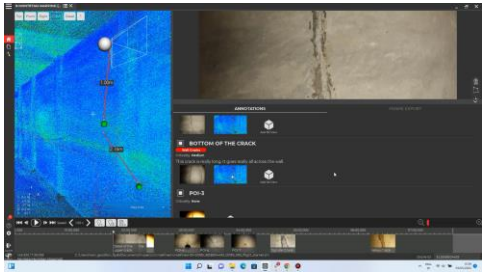
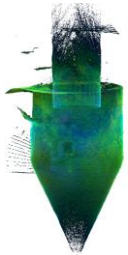
*Requires an Inspector Premium license that comes at additional cost.



SOFTWARE SOLUTIONS

Inspector 4.0
&
GeoSLAM Connect

Which software solution do you need?

	Inspector 4.0	GeoSLAM
Final deliverable	**A report** w/ data localization on a 3D model 	**A survey-grade 3D model** to make measurements 
Mapping precision & accuracy	**+/- 10 cm** local accuracy in average. **2-5 %** drift global accuracy in average. 3D model created in flight with FlyAware™ No loop closure No global optimization.	**+/- 2 cm** local accuracy in average. **0.5-1 %** drift global accuracy in average. 3D model created in post-processing. Loop closure, Global Optimisation. Enhance model w/ filters and adjust algorithm parameters to build optimal model based on data capture conditions.
Data localization	Through Points Of Interest (POI) represented on 3D map.	**Georeferencing (coming soon)** using ground control point. No POI system.
Reporting capability	Using POI system	-
2D measurement	Distance and surface measurement on POIs and in the 3D model	Using GeoSLAM Draw
3D measurement	-	Using GeoSLAM Volume

3D SURVEYING SOLUTION

FLYABILITY + GeoSLAM



Surveying the inaccessible.

Turn Elios 3 data into survey-grade 3D models using GeoSlam Connect.
A software solution developed to help surveyors map the most unreachable places.

3D SURVEYING SOLUTION

Survey-Grade Point Clouds.

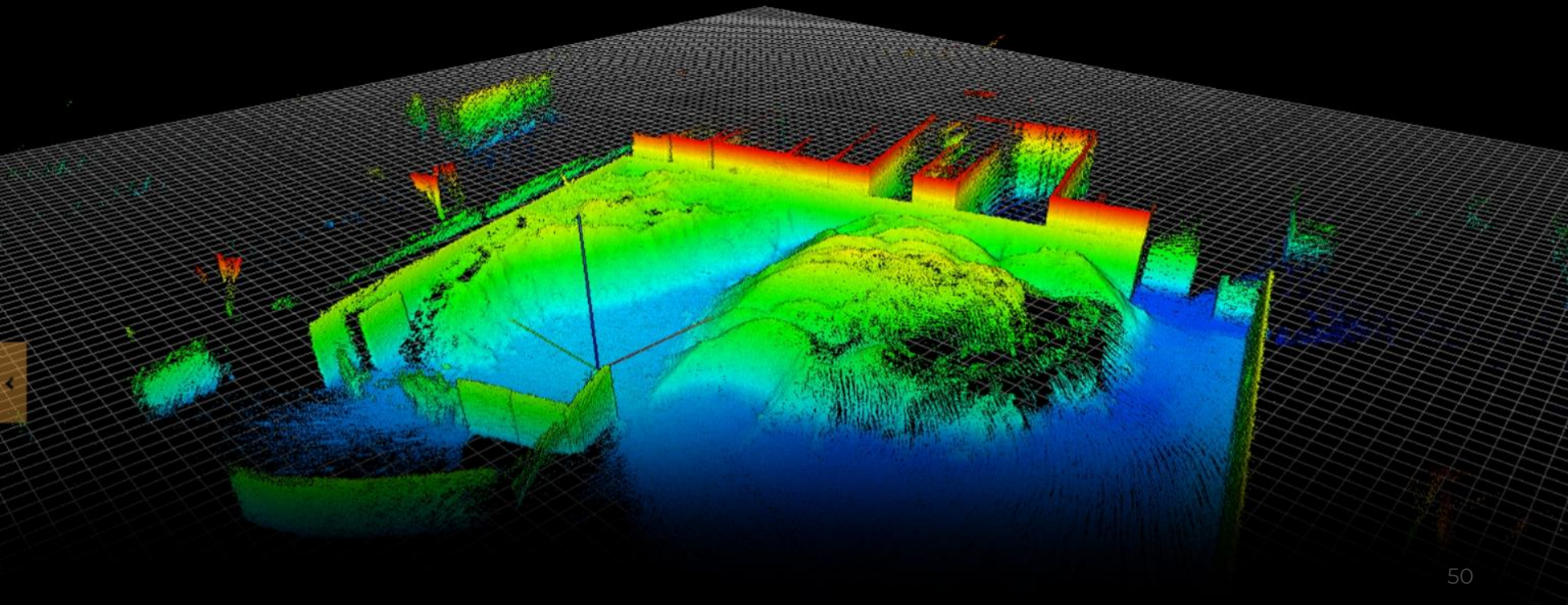
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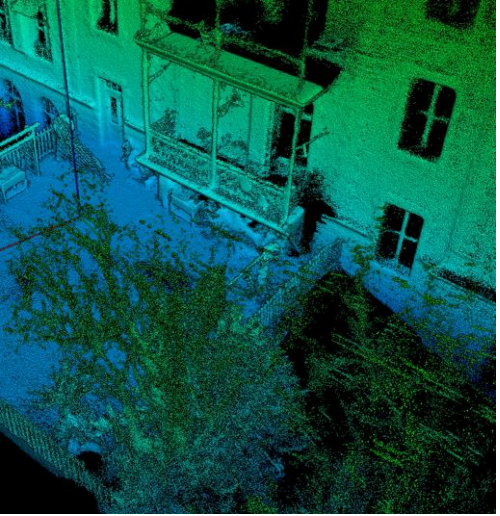
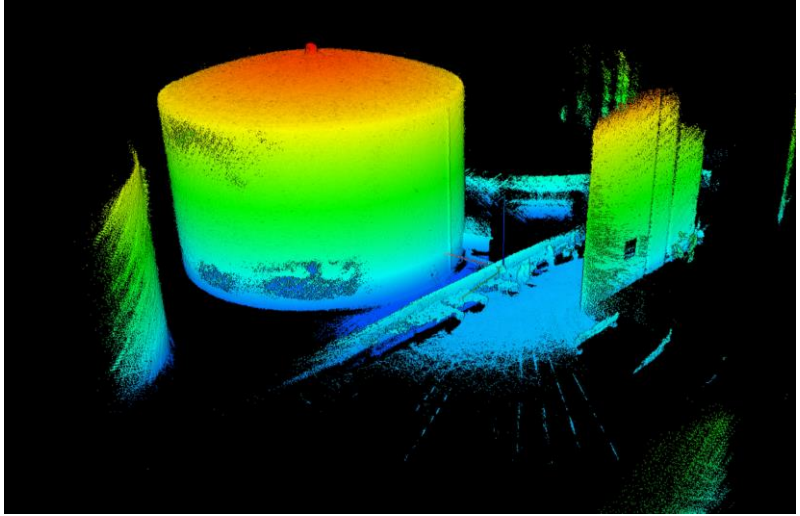
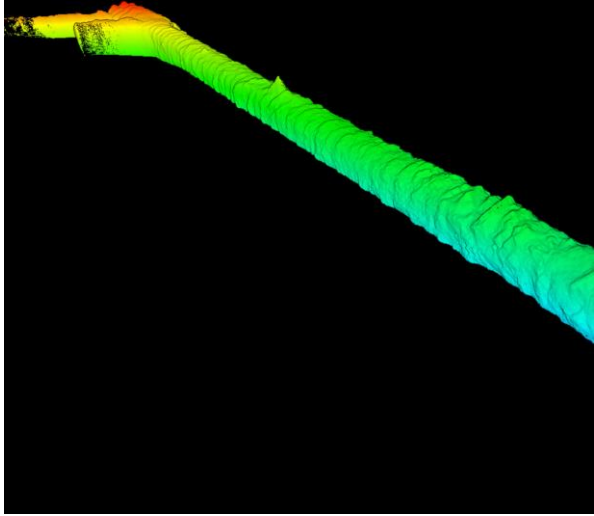
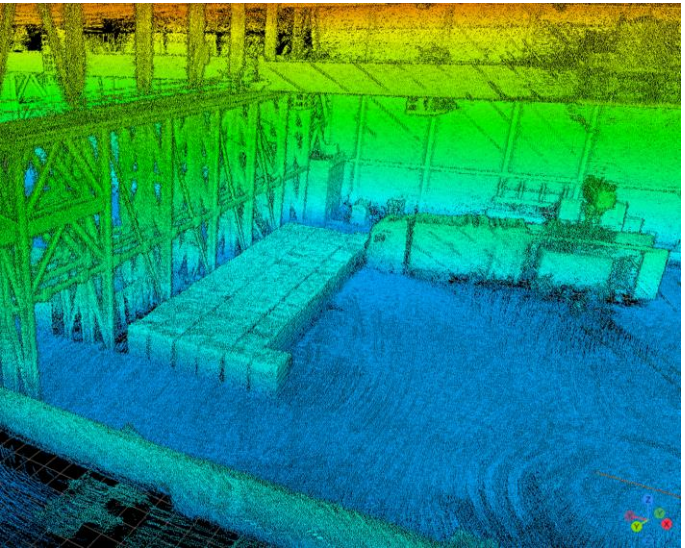
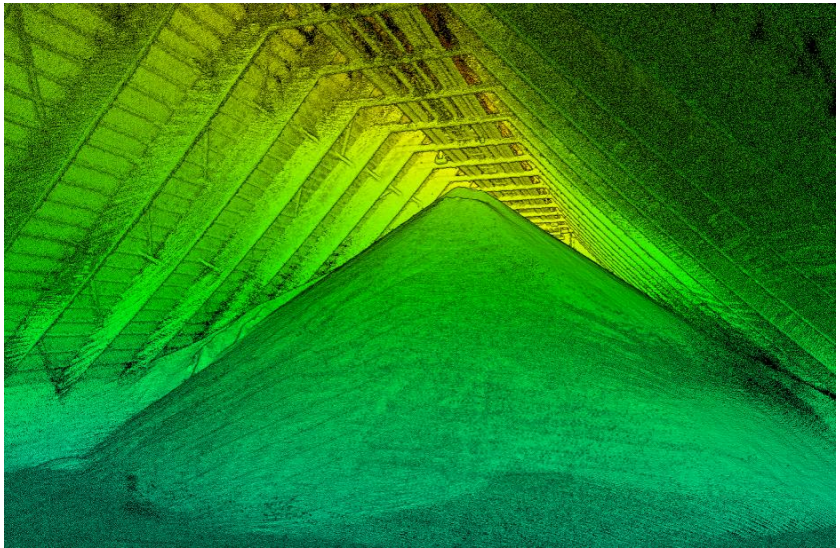
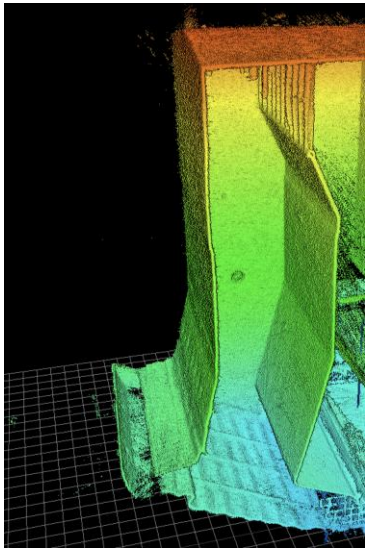


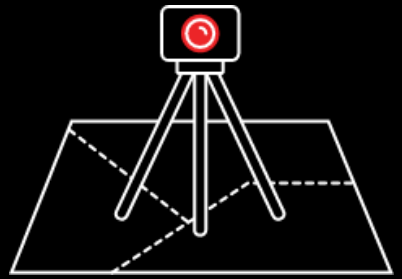
3D model of a Cyclone used in the Cement industry

Take the guesswork out of your surveying operations

Mapping areas that are out of reach or too dangerous for humans is very difficult yet critical to support operational decisions. Elios 3 and GeoSLAM Connect work hand in hand to map and survey the most inaccessible spaces, guiding your business decisions with precise and accurate data - in all safety.

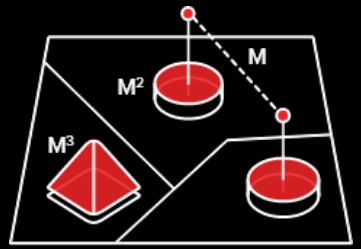




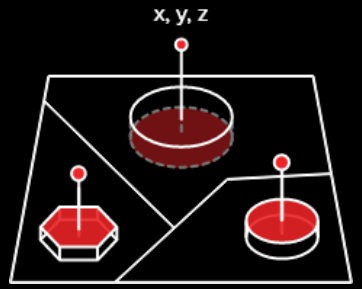
Survey-grade mapping

Transform Elios 3 LiDAR datasets into highly accurate 3D models with a precision of ± 2cm thanks to a robust SLAM algorithm featuring loop closure & global optimization.



Highly accurate measurement

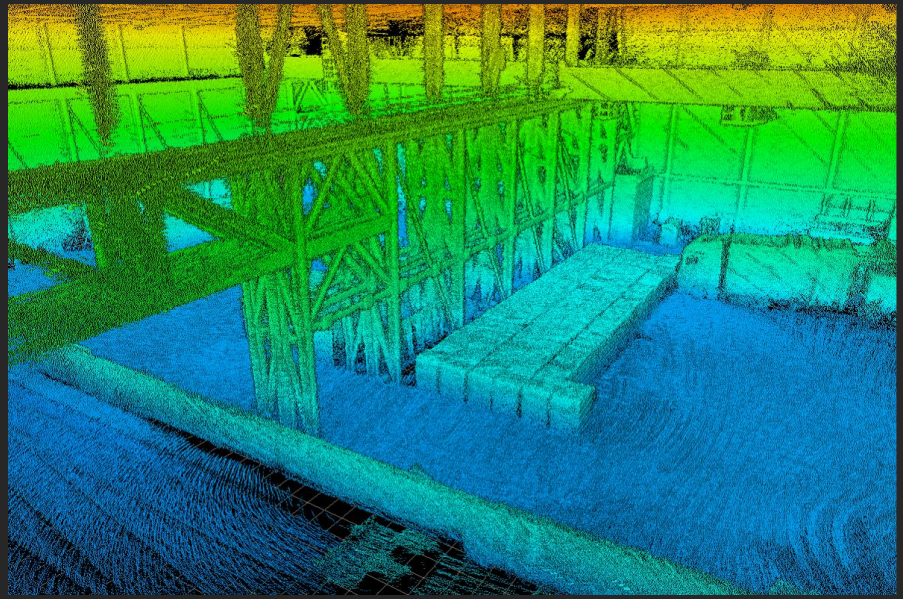
Perform distance, surface, and volumetric measurements to support various use cases in Mining & Aggregates or Infrastructure & Utilities industries.

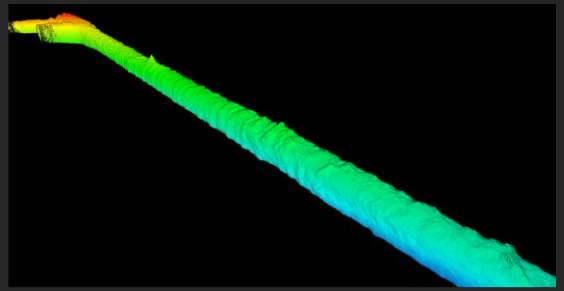


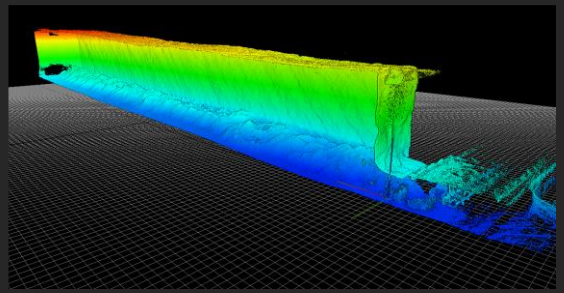
Georeferencing

Accurately match any point of your map with its coordinates in the real world. Combine multiple models, aggregating data captured across missions to get a consolidated view of your workings.

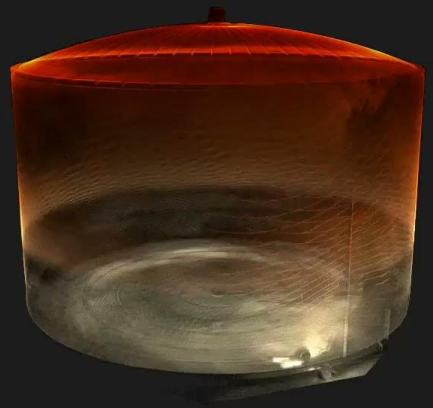
Survey-Grade Point Clouds

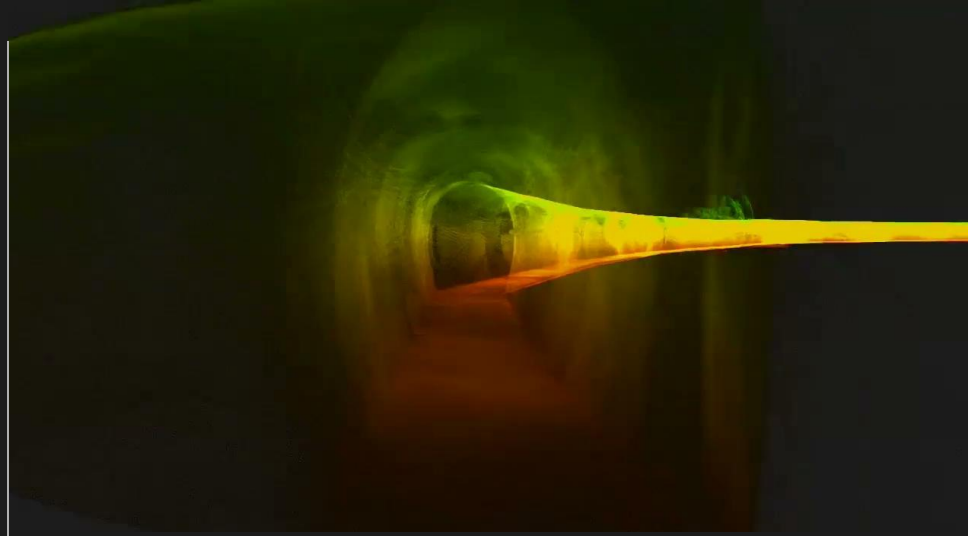


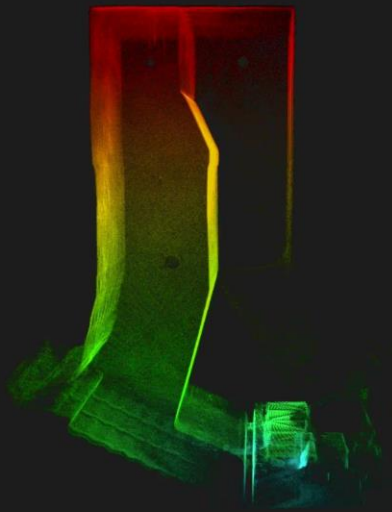


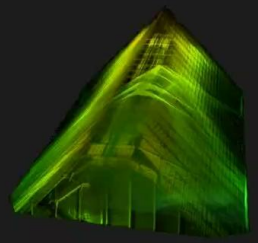


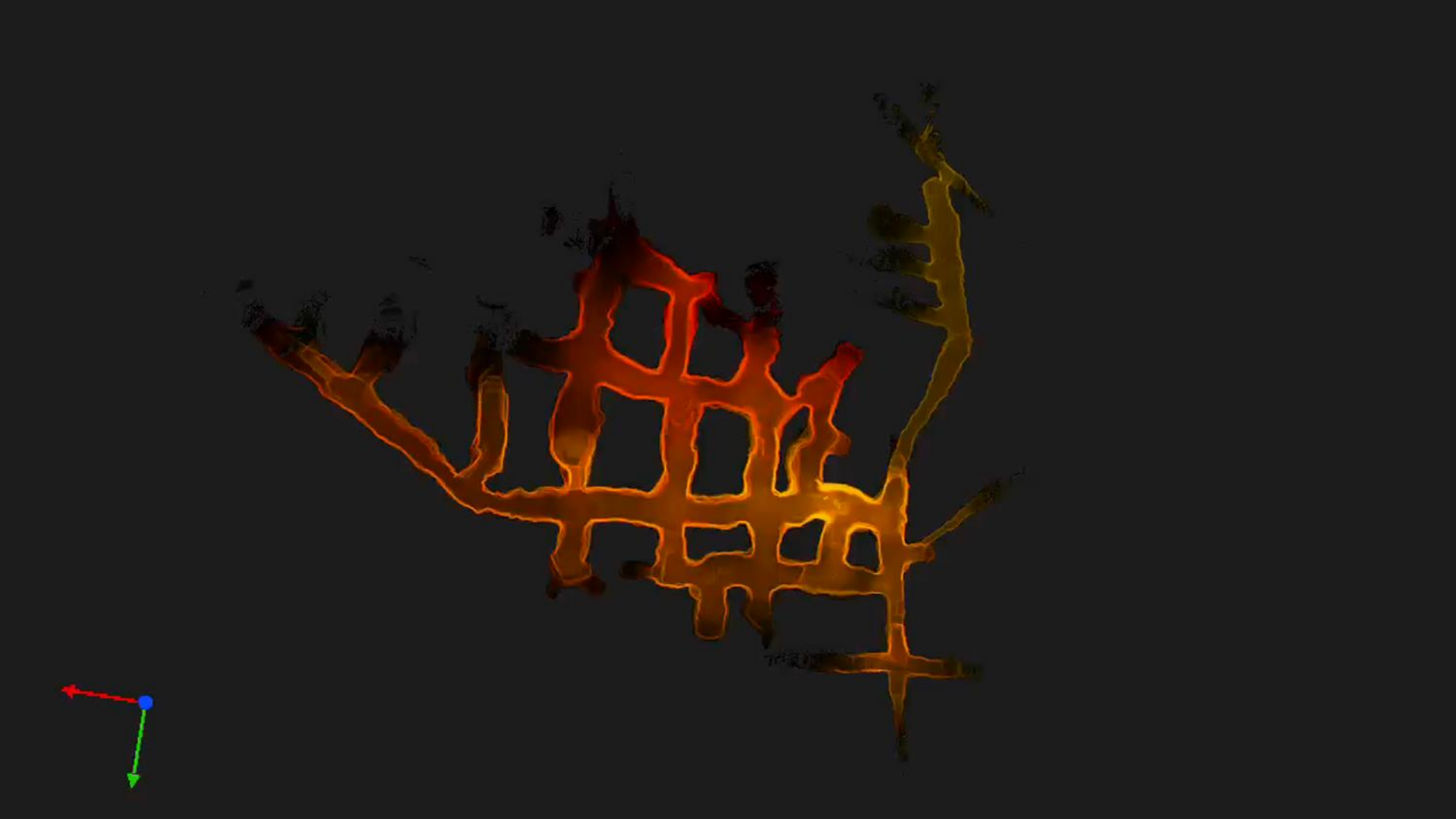
From left to right, top to bottom: Hall with cases, Ore pass, Salt mine gallery



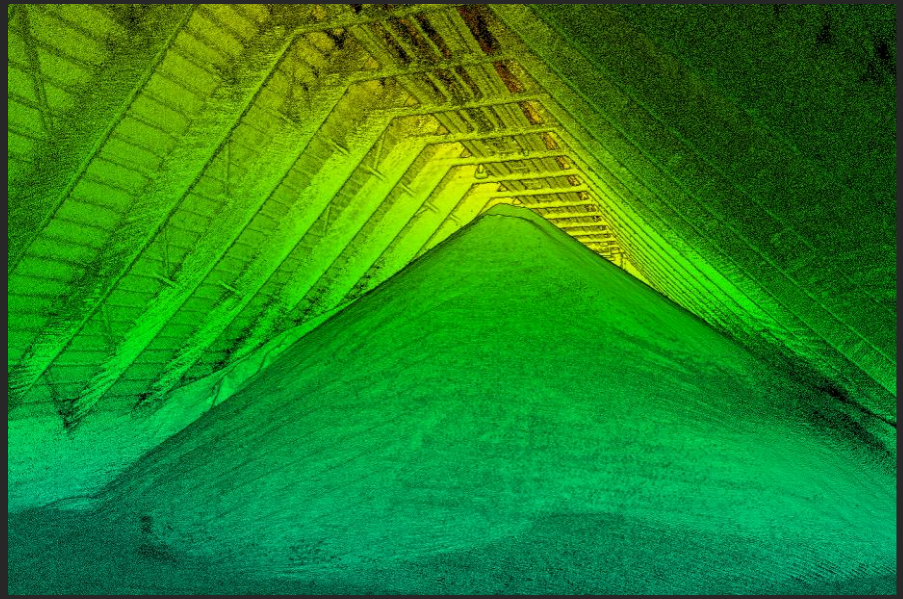


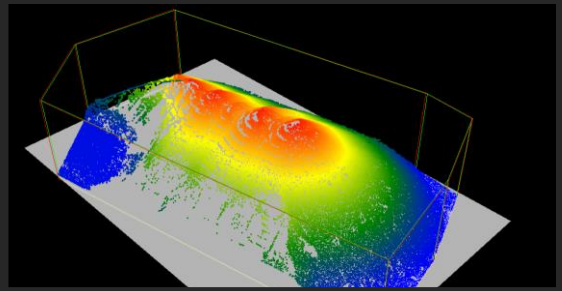


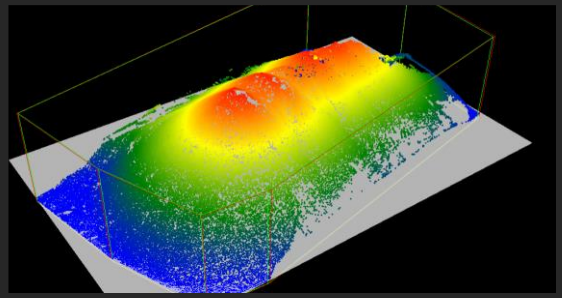




Stockpile Volume Monitoring







Stockpile volume monitoring using GeoSLAM Volume







MINING

>> Mapping & volumetric measurements

Locations

- Stopes
- Ore passes
- Shafts
- Draw points
- Ventilation systems

Applications

- Convergence monitoring
- Rock mass classification
- Volumetric measurement for over / under break, reconciliations and stockpile paste scheduling
- Confirm backfilling volumes and heights
- Improve scheduling & backfill design, reduce production interruptions
- Quickly identify remaining stope volumes
- Locating hang ups
- Thickness and volume measurement of blockages

INFRASTRUCTURES & UTILITIES

>> Mapping & georeferencing

Locations

- Tunnels
- Buildings
- Production plants
- Construction grounds
- Emergency sites
- Warehouses
- Caves
- Historical sites
- Critical infrastructures such as bridges, pipes, dams, refineries

Applications

- Mapping and georeferencing of existing workings in order to plan for further civil engineering development (usually underground).

STOCKPILES

>> Volumetric measurement & management

Locations

- Silos
- Tanks
- Indoor and underground stockpiles

Applications

- Production
- Beneficiation
- Logistics
- Ports
- Sales

ELIOS 3

FLYABILITY



SAFE DRONES
FOR INACCESSIBLE PLACES