



FLYABILITY INSPECTOR 5.0

USER MANUAL

v1.01

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1. Overview

1.1. Inspector

Inspector 5 is the official Flyability software used to organize and analyze inspection footage gathered from Elios 3 drones. **New projects collected from ELIOS 2 drones are not compatible, however, ELIOS 2 projects present in Inspector 4 will be viewable in Inspector 5.0.** ELIOS 1 data is not compatible, so the previous version Inspector(2.2) should be used here instead.

Flyability drones save the flight data in different locations.

- The videos and still images are saved on the CAM SD card. A new video is automatically created every flight. The maximum file size is 4GB, so when recording in 4K, several videos can be created during one flight.
- The thermal camera data, flight altitude/direction, pointcloud trajectory and raw logs are saved on the embedded SSD.

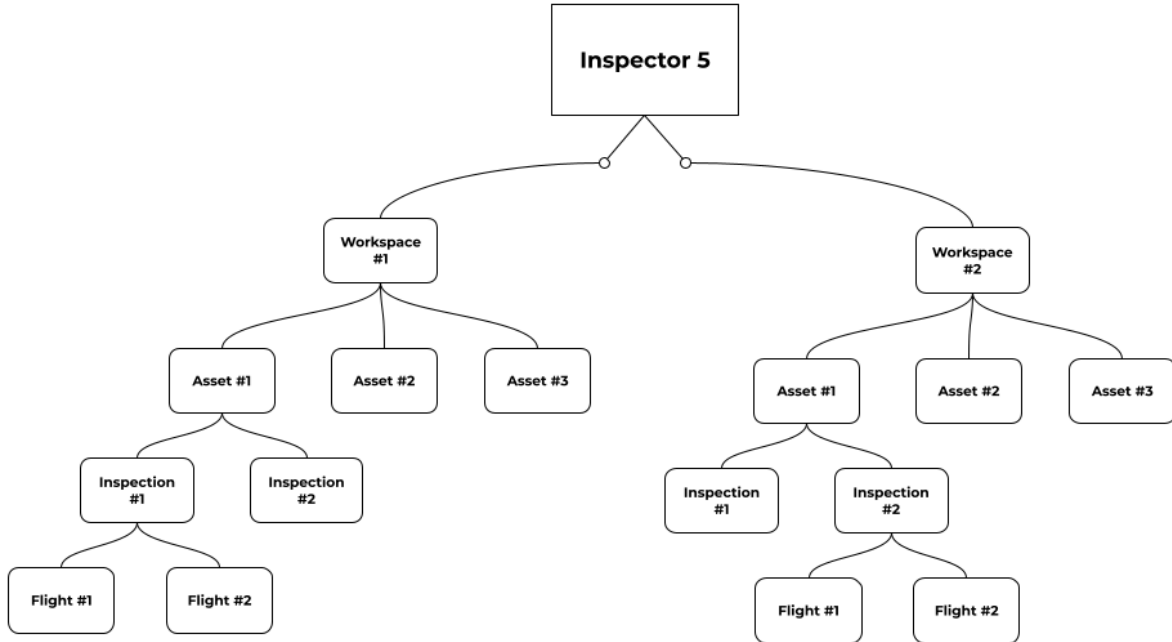
Inspector is used to download data from the drone, automatically matching log files to their corresponding videos, splicing the videos from one flight together, and saves the data into a project folder on your PC.

During post processing, Inspector allows you to:

- Analyze the video frame-by-frame together with the 3D map. (ELIOS 3)
- Align and manipulate multiple flight maps manually. (Premium feature)
- Provide a lower or higher density point cloud of your asset (Depending on LIDAR scanner employed)
- Make distance measurements
- Annotating points of interest
- Export inspection reports

1.2. Data Organization

Consolidate and organize assets, inspections, and flights in Workspaces allowing for the organization and visualization of historical and current data.



Workspace - Main project folder where Inspector stores all the data. Inspector 5 can only open one workspace at the time

Asset - Represents the physical area or object where Inspections are conducted.

Inspection - A collection of flights, usually limited in time, performed to survey an Asset

Flight - A single round, piloted or handheld, from takeoff to landing.

1.3. Asset Management

Additional functions to help simplify data processing workflows by automatically merging data from subsequent flights into a single digital twin of the asset.

- Asset-centric data visualization - View full Inspections in one consolidated map and video timeline. Point clouds, points of interest, and annotations of all the flights composing an inspection are displayed together on a Digital Twin of the asset.
- Inspection-based reporting - Customizable reports from each Inspection consisting of multiple flights.
- Automatically and manually align overlapping flights into a larger reconstruction of the asset and Inspection.

2. Installation

2.1. System requirements

Inspector requires a PC running Windows 11.

Inspector requires an AMD64 architecture (Intel or AMD processor based) machine running Windows 10(64-bits) or newer. It also needs 500 MB of disk space, and it is recommended to have additional 50-100 GB of free disk space for flight data, as each flight produces around 10 GB of data. Currently 16GB of RAM is recommended.

OS: Windows 11

CPU: i7 good from 2021 or higher

RAM: 16 GB minimum

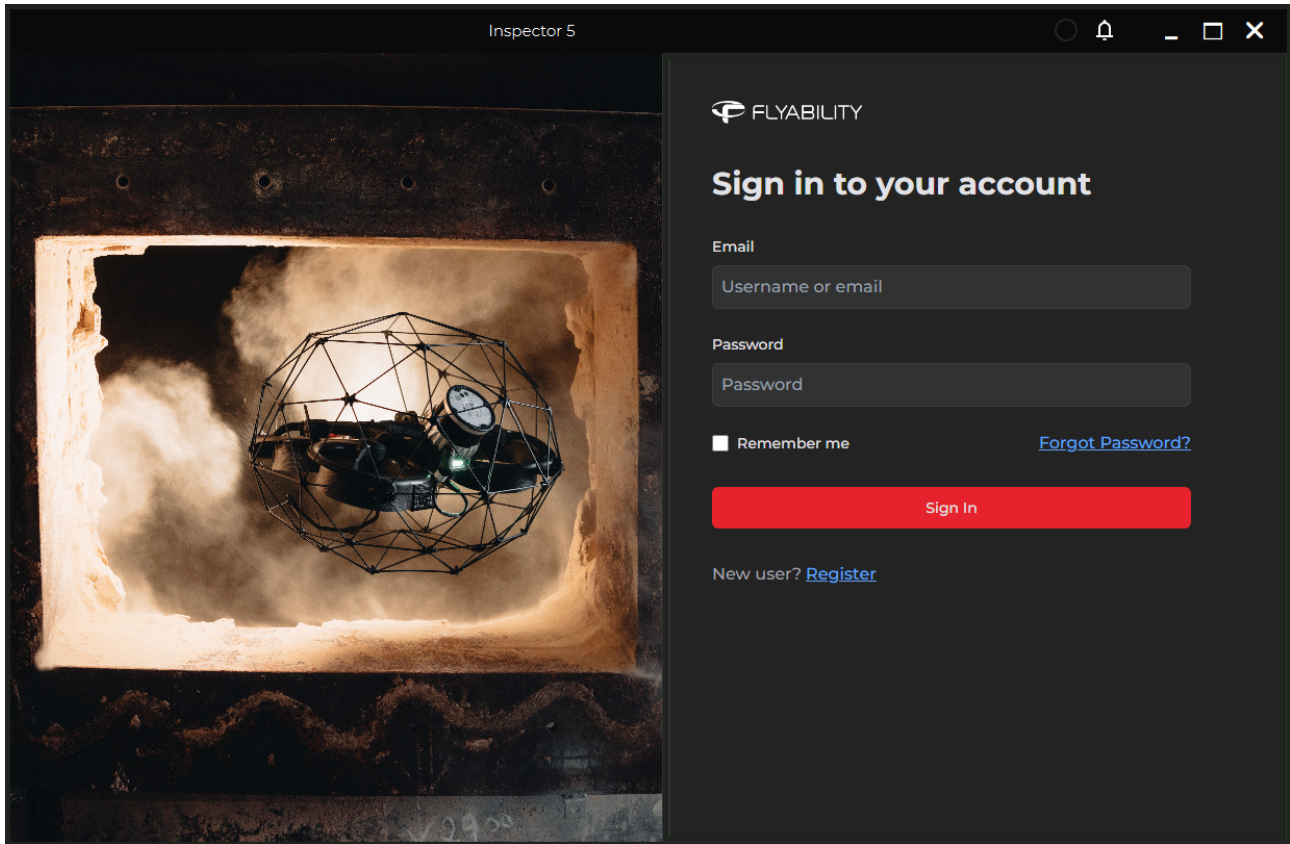
Graphic Card: Required especially for 4K screen. Good integrated one or Nvidia quadro/GTX 10XY for powerful setup

Inspector 5.0 system requirements	
Minimum	Recommended
Windows 11 64-bit	Windows 11 64-bit
Intel Core i5-1135 or AMD equivalent	Intel Core i7-8750H or AMD equivalent
16GB RAM	16+ GB RAM
Iris Xe Graphics (Minimum tested)	Nvidia GTX 1050 or AMD RX 560
30 GB	250+ GB

2.2. Installing Inspector

Inspector 5.0 is distributed as a standard executable installer (.exe), available on flyability.com. Run the installer and follow the instructions displayed. The mapping and localization features are available for free to all Elios 3 users as the mapping and localization are performed by the drone itself during flight time. An active Premium Software Subscription is required in order to get access to additional Asset Management features.

3. Login screen



It is necessary to log in the first time opening Inspector. Without credentials, it will be necessary to create an account online. Be sure to have internet access the first time Inspector is started.

Inspector 4 users Note : The SSO provider has changed since Inspector 5. When coming from Inspector 4, it will be necessary to create a new password when logging into Inspector 5 for the first time.

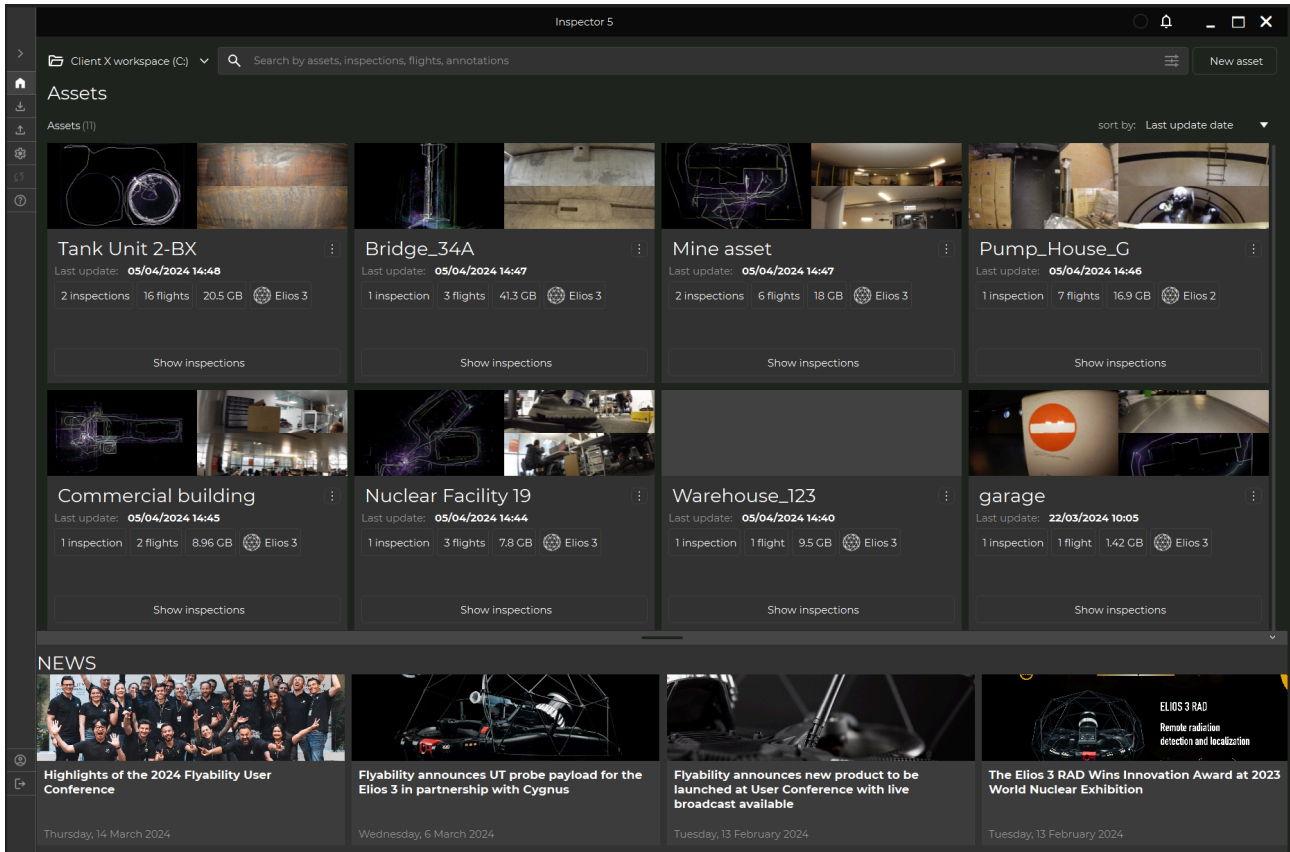
3.1. How to update the password

To create a new password:

- Click **Forgot password?**
- Enter email and Click **Submit**.
- Go to email and click **Reset Password**.
- Enter and confirm a new password.
- Log in to Inspector 5.

4. Assets Screen

Home screen with a view of all assets in the selected Workspace. Select an asset to view more info and to open it.



Search Bar

The search bar can be used to quickly search for a specific asset, inspection, flight, or annotation.

New Asset

Click the **New Asset** button to create a new asset.

- Enter Asset Name.
- Enter Asset Description (optional).
- Click **Create**.

Assets

A list of assets which have been imported in the selected workspace.

- Assets can be sorted according to: Creation date, Last update date, or Name.

News

This section will display recent updates and information concerning Flyability products and software.

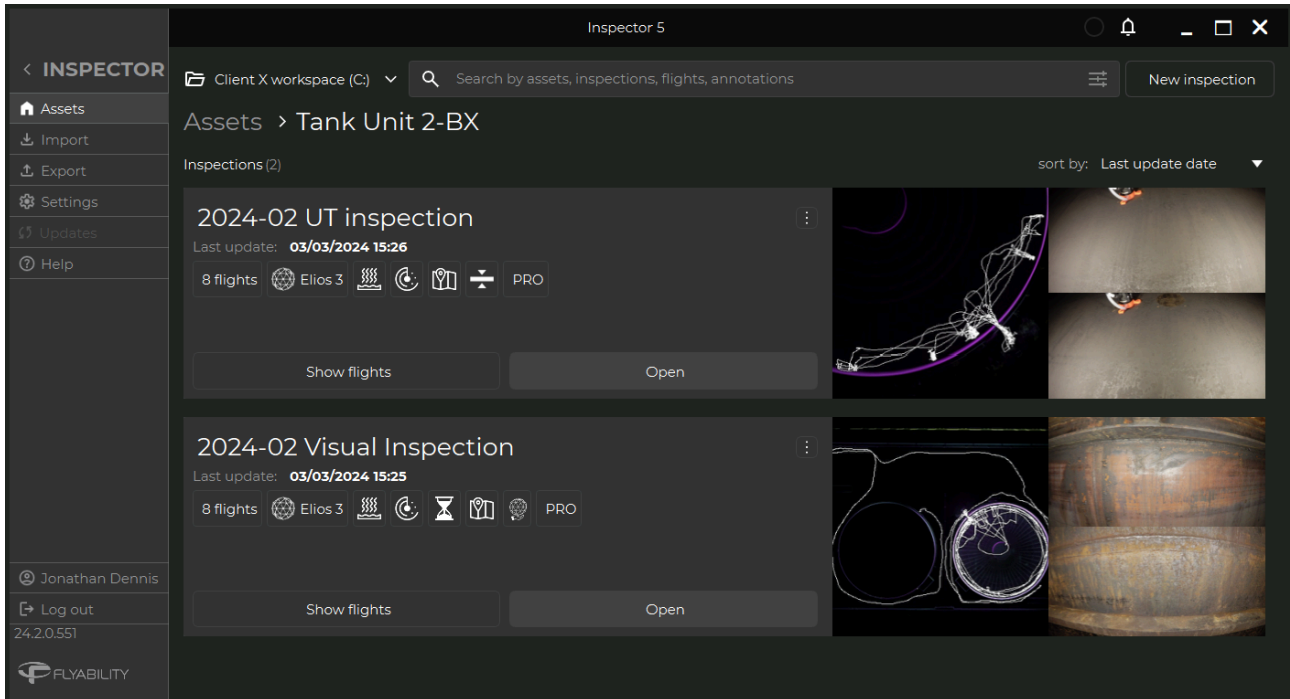
Asset

Each asset contains the following information:

- Name - Edit or delete from the dropdown menu.
- Date and time of last update.
- Number of inspections and flights collected, Asset file size, and drone employed.
- **Show Inspections** - Click to access Inspection Screen for the Asset.

4.1. Inspection Screen

View all inspections related to the asset.



Search Bar

The search bar can be used to quickly search for a specific asset, inspection, flight, or annotation.

New Inspection

Click the **New Inspection** button to create a new Inspection.

- Enter Inspection Name.
- Enter Inspection Description.
- Click **Create**.

Inspections

A list of Inspections which have been imported in the selected Asset.

- Inspections can be sorted according to: Creation date, Last update date, or Name.

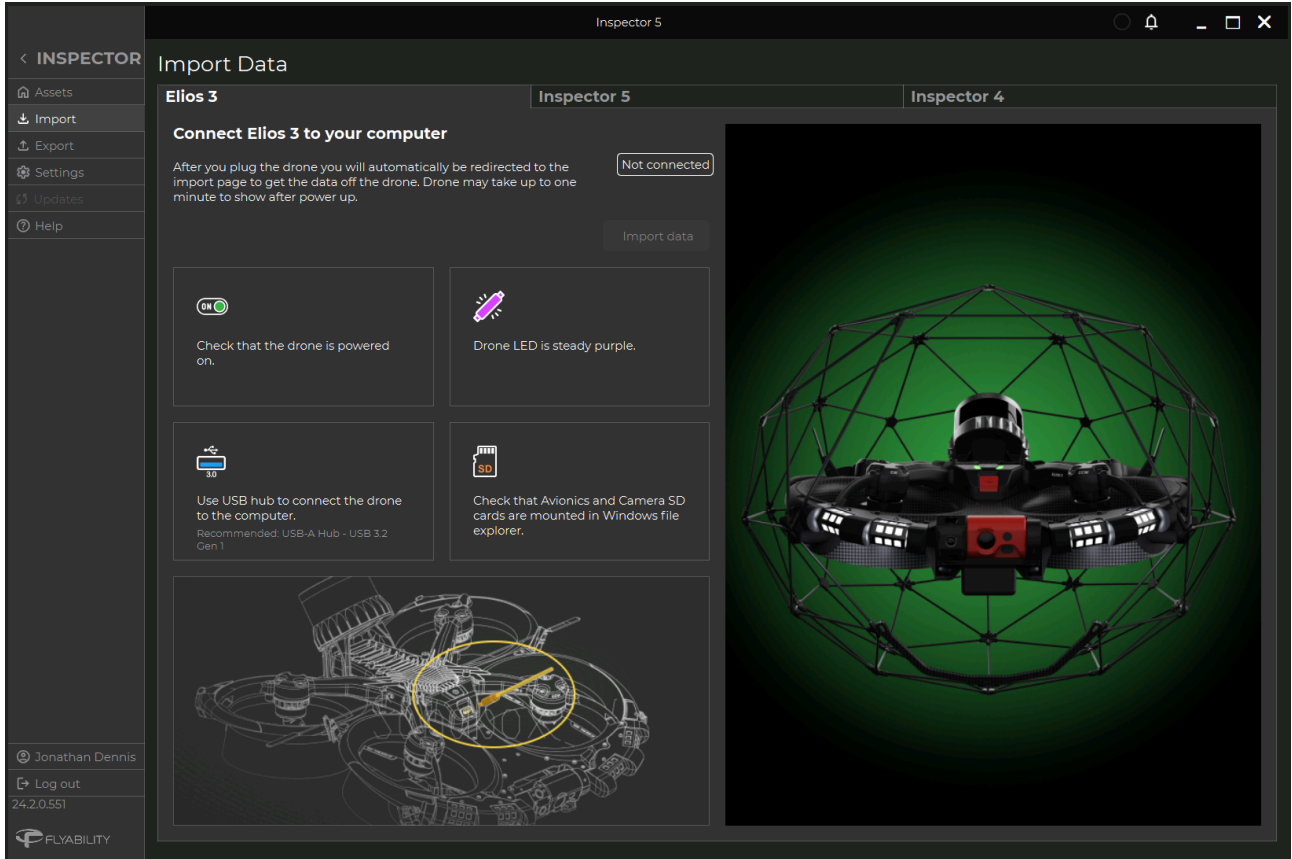
Inspection

Each inspection contains the following information:

- Name - Delete edit or move from the dropdown menu.
- Date and time of last update.
- Number of flights collected along with features of the Inspection.
- **Show flights** - Click to access Flight screen.
- **Open** - Click to open the Inspection. View the combined 3D flight maps, videos, and POIs for the selected inspection. ***Accessible only with an active Premium Software Subscription.**

5. Import Screen

This screen is used to import data from the Elios 3 onto the computer, from one Workspace to another, or from Inspector 4 to Inspector 5.



Connection

This is where the connection process between the drone and computer is indicated. For the connection process to start, plug the USB-C cable, and power-up the drone by plugging in a battery pack and pressing the power button. After plugging in the drone, the import page to access the data of the drone will be visible. Please note that drone booting may take about 2 minutes to complete.

Import Data

When connected, click to import Asset/Inspection/Flight data.

Tips to Connect

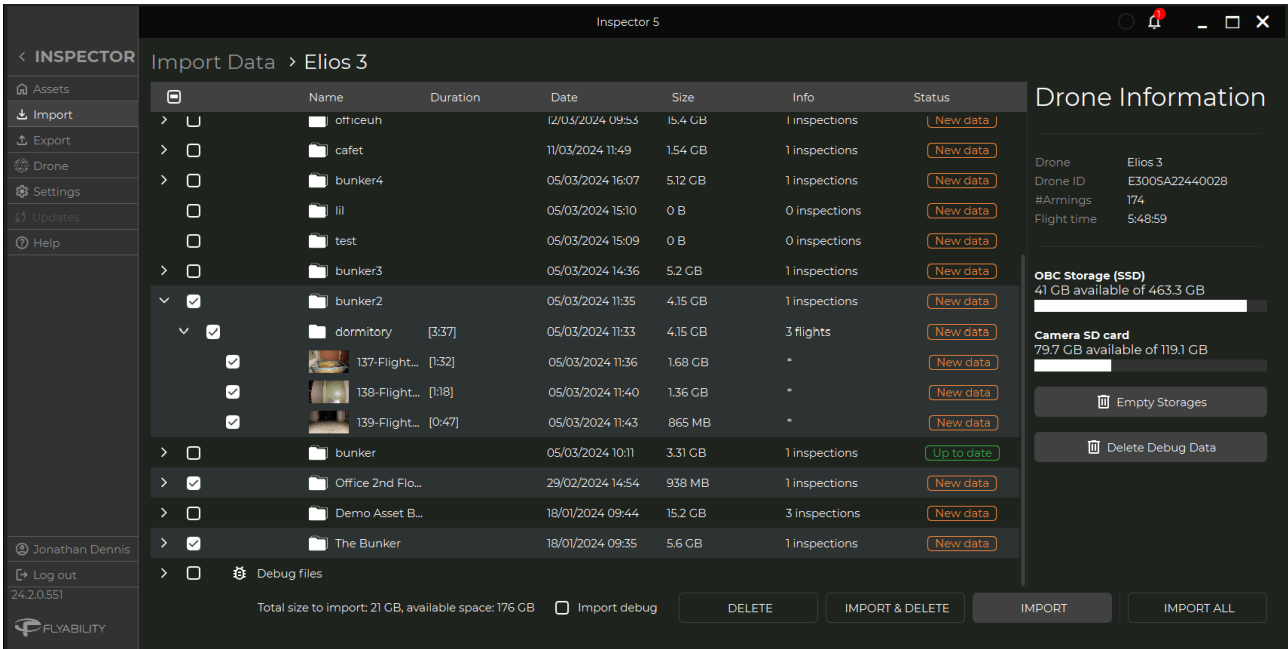
Tips displayed related to the drone connection.

Connection Troubleshooting

- Always use a high quality USB cable, equivalent to the one provided.
- If encountering connection issues, we recommend connecting the Elios 3 drone through the provided USB hub or equivalent hub.
- If connection issues persist, disconnect the wifi, and please try again.

5.1. Elios 3 import

Import data from an Elios 3.



The screenshot shows the 'Inspector 5' application window. The main area is titled 'Import Data > Elios 3' and contains a table with the following columns: Name, Duration, Date, Size, Info, and Status. The table lists various folders and flight files, such as 'officeuh', 'cafet', 'bunker4', 'dormitory', and '137-Flight...'. Each row has a checkbox for selection and a 'New data' button. At the bottom of the table, there are buttons for 'DELETE', 'IMPORT & DELETE', 'IMPORT', and 'IMPORT ALL'. On the right side, the 'Drone Information' panel shows details for the Elios 3 drone, including its ID, armings, flight time, and storage status for the OBC Storage (SSD) and Camera SD card.

Import Data View

List of all the Assets/Inspections/Flights, and Debug files found on the Elios 3. Data is arranged by asset, with the option to expand to individual Inspections and Flights. Each file lists:

- **Name** - Name of asset, inspection, and flight.
- **Duration** - Duration of total inspection and/or flights.
- **Date** - Date last updated.
- **Size** - Folder size, to include any nested folders. e.g. An asset folder size includes all Inspections/Flights contained within it.
- **Info** - Number of Inspections in Asset folder, or number of Flights contained in Inspection folder.
- **Status** - New, Importing, or Up to date.

How to import

Select a checkbox to import the associated data. Flights will be ordered by Asset, Inspection, and Flights. It is possible to select all or by Asset, Inspection, and/or Flight.

- **Browse** to select the folder with flights/Inspections/Assets to import.
- Click a checkbox to select data for import.
- Select checkbox to import Debug Files. (Optional)
- Click **Import** for selected data, or click **Import All** to import all data.

Drone Information

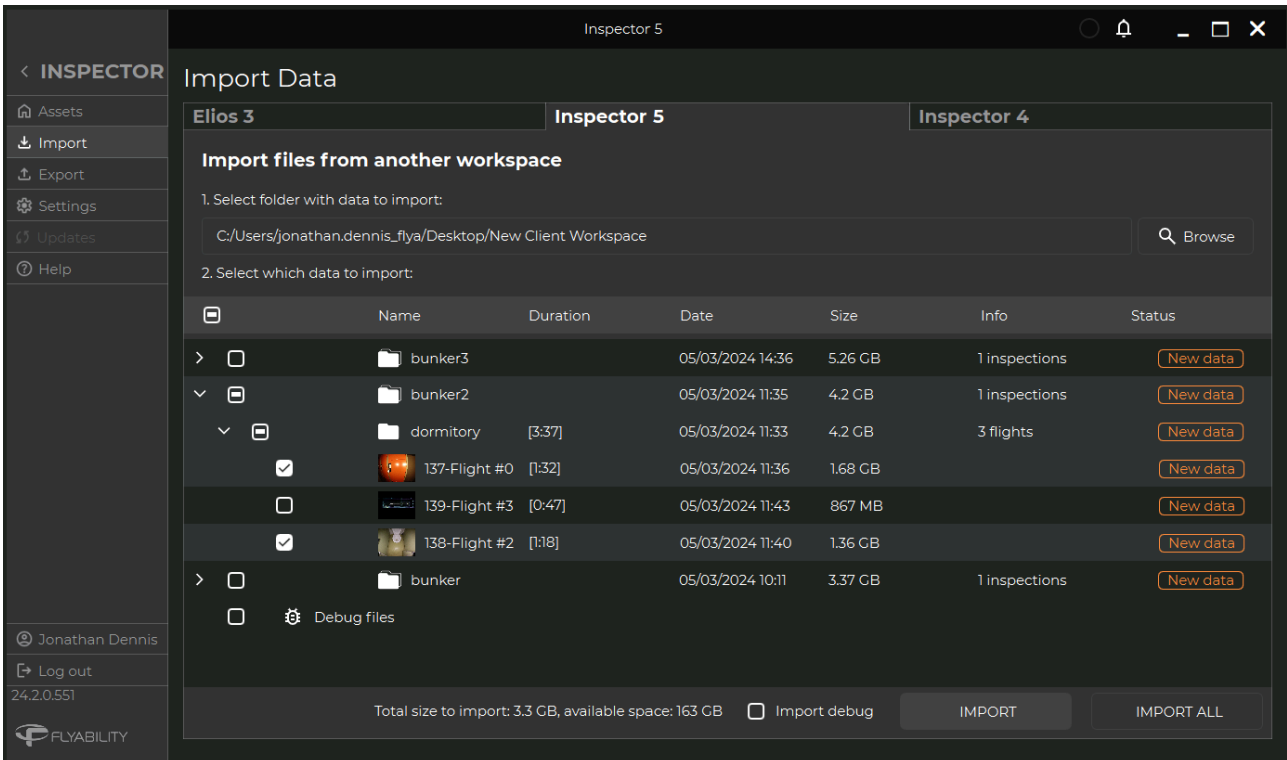
Data related to the drone connected. To include:

- **Drone info** - Drone ID, # Armings, and Flight time.
- **Storage** - Amount of space available on the OBC Storage (SSD) and Camera SD card.
- **Empty Storages** - Deletes all data stored on the drone, including LiDAR scans, Video, Images, and logs.
- **Delete Debug Data** - Click to delete IDLE phases logs on the connected Elios 3. (IDLE phases logs are the bag files of when the drone is NOT flying. Basically VIO cameras, automation logs and lidar scans are stored in these)

Bottom bar

- **Storage info** - Total size of import / available space
- **Import debug checkbox** - Select to import debug data.
- **Delete Button** - Delete the selected flights from the drone's SD card. Copies previously imported onto your PC will not be affected.
- **Import & Delete Button** - Click to import and delete selected Assets/Inspections/Flights into the Workspace.
- **Import Button** - Click to import all selected Assets/Inspections/Flights into the Workspace. Once copied, all data will be accessible through the Assets screen.
- **Import All** - Click to download all assets/Inspections/Flights.

5.2. Inspector 5 - Import from another Inspector 5 workspace



Use the Inspector 5 tab to import assets, inspections, or flights from one workspace to another.

Import Data View

List of all the Assets/Inspections/Flights, and Debug files in the selected Workspace. Data is arranged by asset, with the option to expand to individual Inspections and Flights. Each file lists:

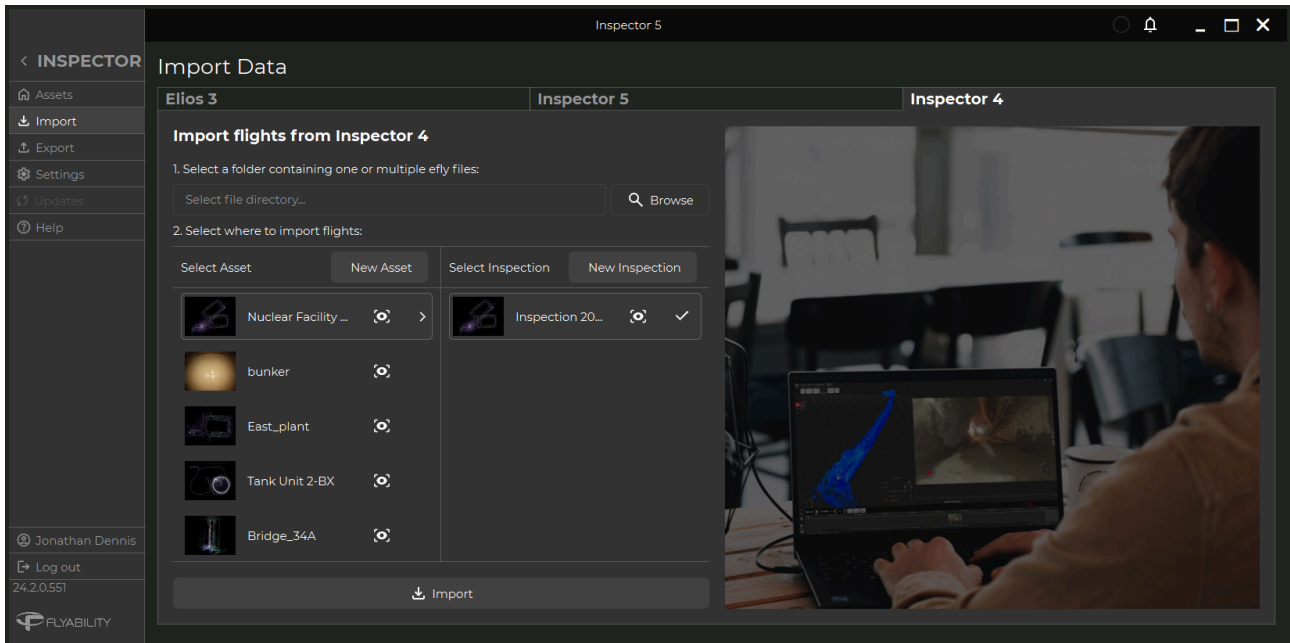
- **Name** - Name of asset, inspection, and flight.
- **Duration** - Duration of total inspection and/or flights.
- **Date** - Date last updated.
- **Size** - Folder size, including nested folders. e.g. An asset folder size includes all Inspections/Flights contained within it.
- **Info** - Number of Inspections in Asset folder, or number of Flights contained in Inspection folder.
- **Status** - New, Importing, or Up to date.

How to import

Select a checkbox to import the associated data. Flights will be ordered by Asset, Inspection, and Flights. It is possible to select all or by Asset, Inspection, and/or Flight.

- **Browse** to select the folder with flights/Inspections/Assets to import.
- Click a checkbox to select data for import.
- Click **Import** for selected data, or click **Import All** to import all data.
- Select checkbox to import Debug Files.

5.3. Inspector 4 - Import data from Inspector 4



Use the Inspector 4 tab to import flights from existing Inspector 4 datasets.

Import Data View

Lists of the Asset and of Inspection folders from the selected Workspace.

NB: Click the eye icon for more Asset and Inspection information.

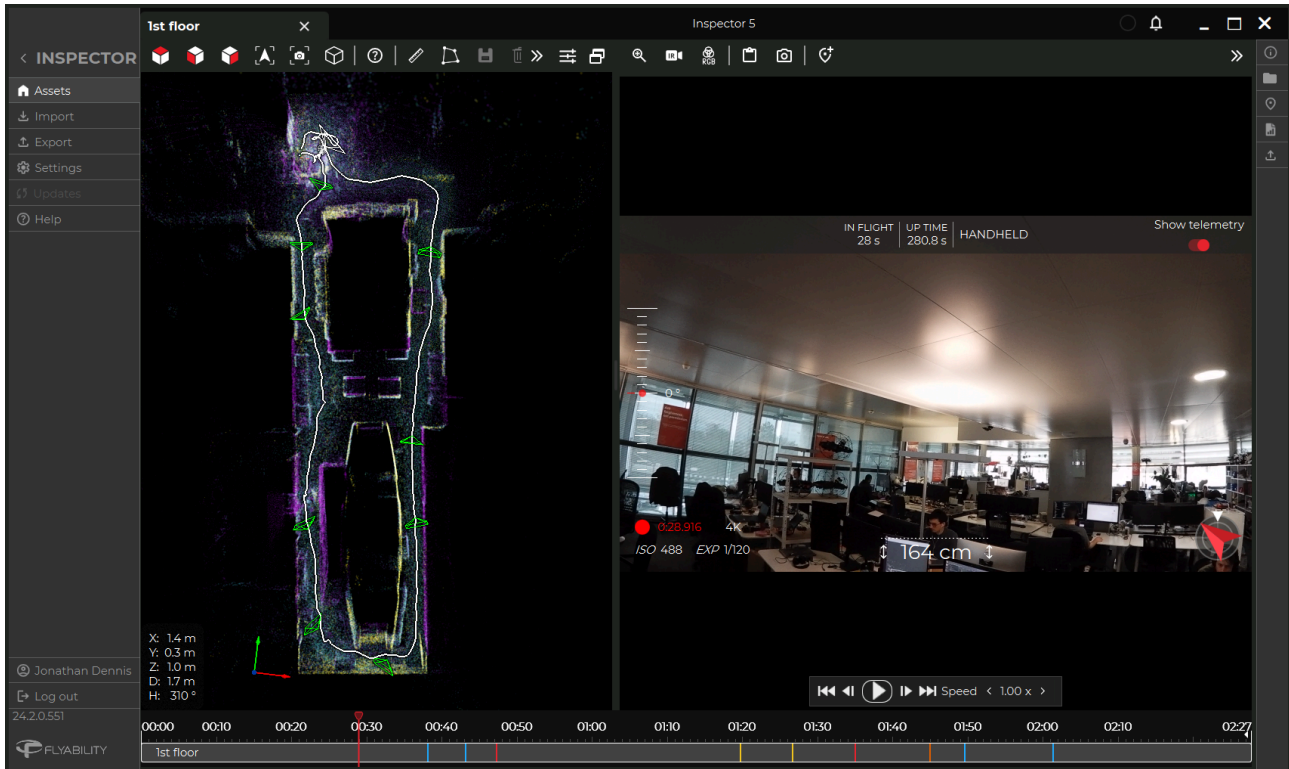
How to import

- **Browse** to select a folder containing one or multiple .efly files to import.
- Select a folder to import the flights to. Click the **New Asset** or **New Inspection** button to create new folders as needed.
- Click **Import**.

Inspector 4 datasets will need to be manually imported into Inspector 5 workspaces.

Flight data from the Elios 2 is not compatible with Inspector 5 and must be imported into Inspector 4 before being imported into Inspector 5.

6. Flight Screen



The flight screen accesses the 3D map, flight video, and Points of Interest (POIs) for the flight. Clicking on a point or POI in the 3D map will align the video or POI in the video flight screen. Clicking on a point or POI in the timeline will align the drone to the same point in the 3D map.

6.1. 3D map

View and explore the point cloud created from the flight indicating the path, and POIs taken.



The 3D map top toolbar contains:

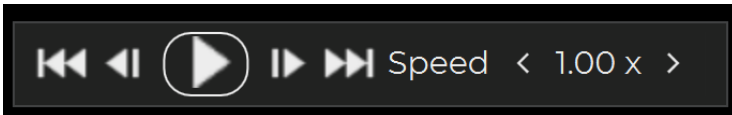
- View from top - Click to view the 3D model from above.
- View from front - Click to view the 3D model from the front.
- View from the right - Click to view the 3D model from the right side.
- Camera around drone - The camera can rotate, but will always be locked towards the drone. This option is ideal to focus on the drone's current position without having to search for it.
- Drone Camera view - The camera is in first-person view (FPV), and is locked in the position of the actual camera of the drone. The pitch of the camera during the actual flight is also applied to the user camera.
- Switch Camera to Perspective or Isometric modes.
- 3D Viewer Commands Description.
- Measure a Distance - Every two clicks to show the measured distance between two points.
- Measure a Polygon Area - Number of consecutive clicks to select an area, display distances between points, and the surface value, as long as the points are approximately located on a flat plane.
- Save Selected Points - Click to save Measurement and/or Area selected.
- Reset Selected Points.

- Show / Hide Toolbar.
- Open view settings.
- Separate window.

6.2. Flight Video

Replay flight video footage. Review, edit and add Points of Interests(POIs) from the video.

The data and controls overlaying the video image can be toggled on and off by clicking the **Show Telemetry** toggle. Double clicking toggles full screen mode.



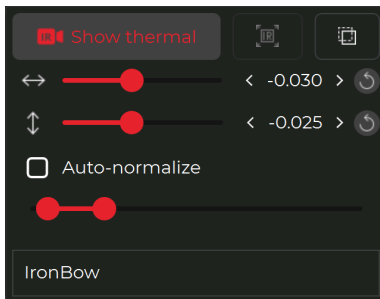
Video Playback Controls

- Play or Pause the video (Space bar)
- Previous / Next frame (arrow left/right)
- Move to the beginning / end of the flight
- Set the playback speed.



The **Video Toolbar** contains:

- Zoom Control - Zoom in during playback.
- Thermal video settings.

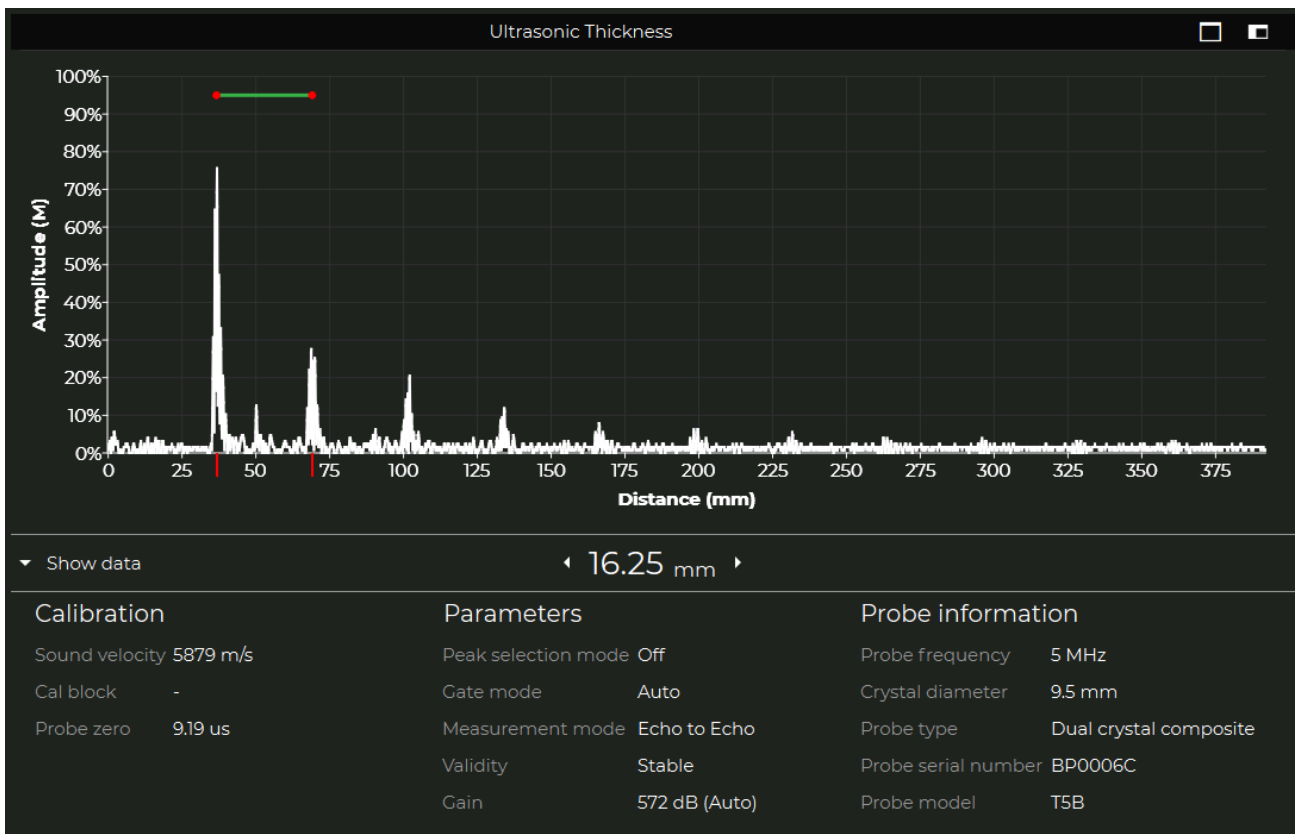


- Toggle Thermal display.
 - Maximize layer.
 - Transparent layer.
 - Position on screen.
 - Auto/manual normalize.
 - IronBow, Rainbow, Greyscale selection.
- Video Brightness/Contrast Settings.
- Copy current image to clipboard.
- Save current image to file.
- Add new Point of Interest(POI)
 - Name
 - Tags (ability to colorize)
 - Criticality level (ability to colorize)
 - Description
 - 3D Location coordinates.
 - View on map.
 - Save / Delete

6.3. Side Toolbar


Toolbar to access additional features related to the selected flight.

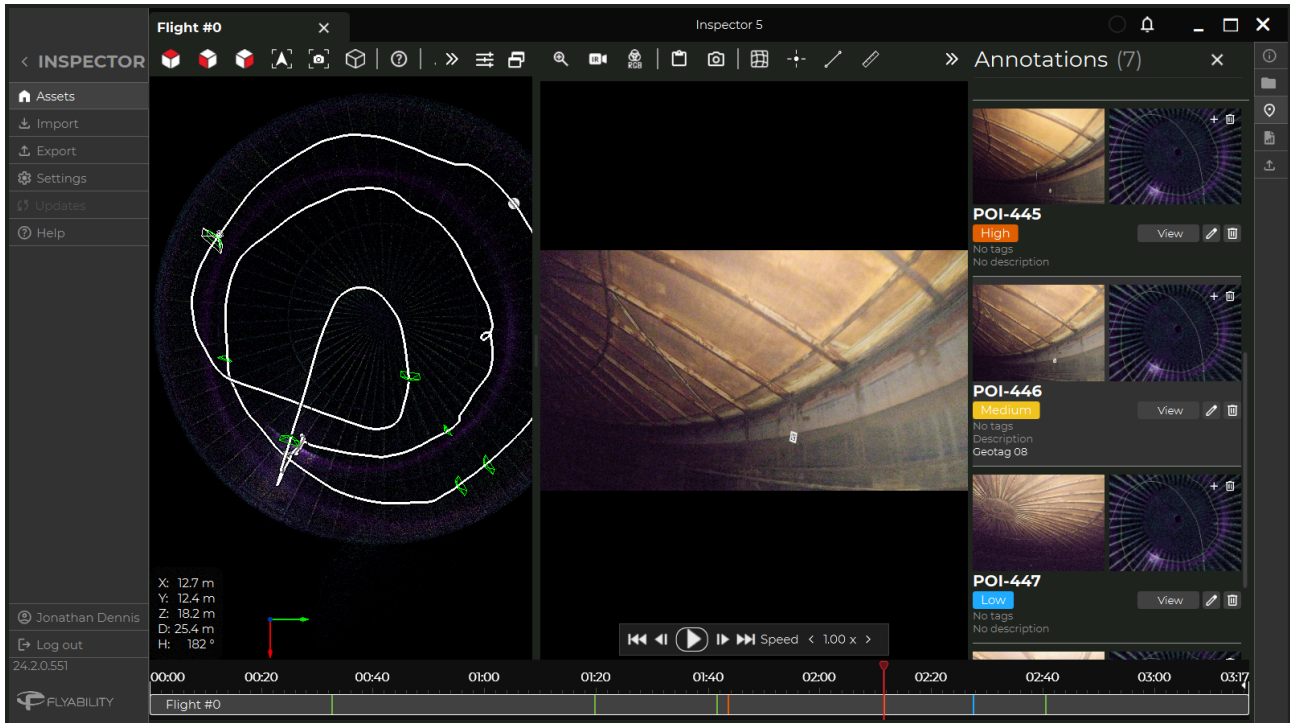
- **More Information** - Open sidebar to see additional flight information.
- **Show flights** - Select flights for visualization. and toggle **Trajectory, Map** , and **Snapshot** visualization in the 3D map.
- **Points of interest** - Open sidebar to show points of interest thumbnails.
 - View POI - Show enlarged image and location in 3D map
 - Edit POI - Edit Name, Tags(ability to colorize), Criticality level(ability to colorize), and Description.
 - View UT data *UT payload feature
 - Erase POI - Delete POI.
- **Generate report** - Select and arrange the contents to be included in the report
 - Preview - See a preview of report before exporting.
 - Select Logo - Add custom logos to the report.
 - Generate PDF - Generate a final PDF of the report.
- **Export**
 - Data - Export flight Point cloud and/or snapshots.
 - PIX4D - Export frames from video for PIX4D processing software.
 - FARO - Export to FARO connect.
- **UT Chart (UT payload feature)** - Click to view UT measurements. *UT payload feature



Ultrasonic Thickness chart sample.

6.4. Points of Interest (POIs)

Points of Interest(POI) can be created during flight by pressing the POI button on the controller and created later in Inspector by clicking the  button in the top toolbar, or Right-Clicking the Timeline..

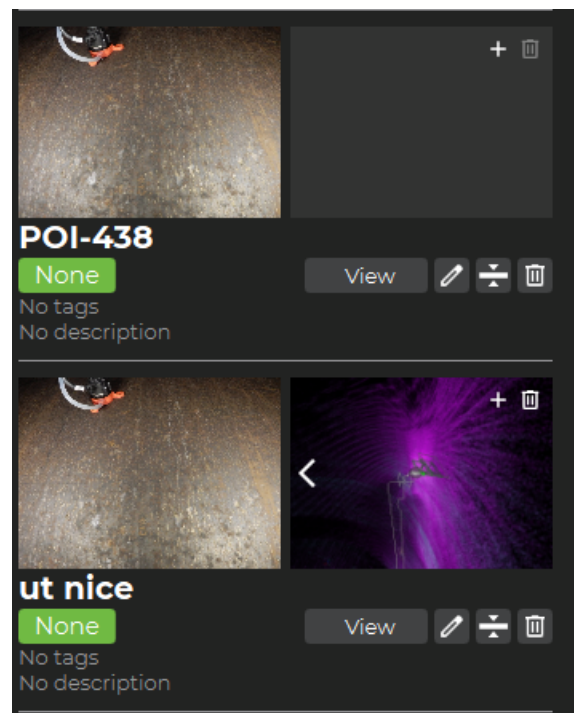


POIs are used to highlight observations made during the flight, they can also be used to make measurements, and can be annotated with a name, comments and tags. The criticality level can be indicated by color.

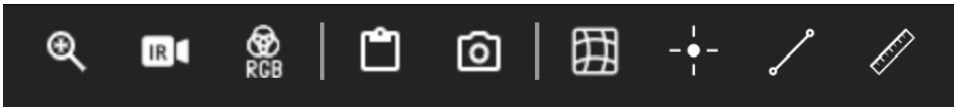
Clicking on a POI in the video timeline (criticality colored bar), 3D map (green wire frame), or POI Icon in the sidebar opens the annotations side window where a list of the POIs are displayed.

Information contained:

- Image of the POI. Click the thumbnail to enlarge.
- Add or delete 3D screenshot.
- Name of POI.
- Criticality (ability to colorize).
- Tags (ability to colorize).
- Description - Input text description.
- **View** - Click to visualize in the 3D viewer.
- **Edit** - Click to edit POI name, tags (ability to colorize), criticality level (ability to colorize), and description.
- **View UT data** - Click to view UT measurements.
*UT payload feature
- **Delete POI** - Click to delete the POI.



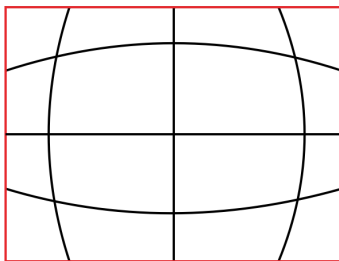
POI toolbar



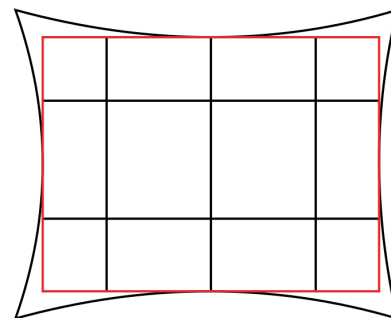
The settings changed here will only reflect the current POI, and not the entire video.

The POI toolbar contains:


- Zoom Control.
- Thermal image settings.
- Image Brightness/Contrast Settings.
- Copy current image to clipboard.
- Save current image to file.
- Undistort



ORIGINAL IMAGE - DISTORDED

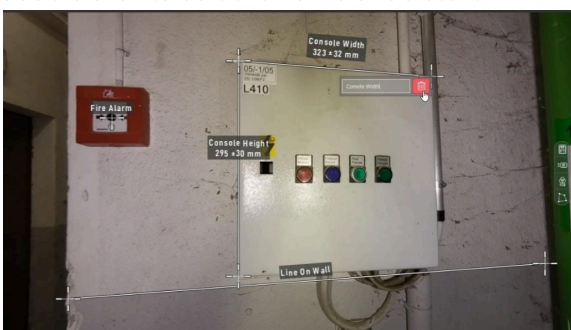


UNDISTORDED

 Border of displayed imaged

Due to the fish-eye effect of the optical camera, the image is distorted. Meaning the straight lines appear to be bent in the image. In a POI the image can be undistorted or flattened. As the transformation stretches the image, the resulting frame displayed is slightly cropped. This feature works best on images taken perpendicularly to a flat surface.

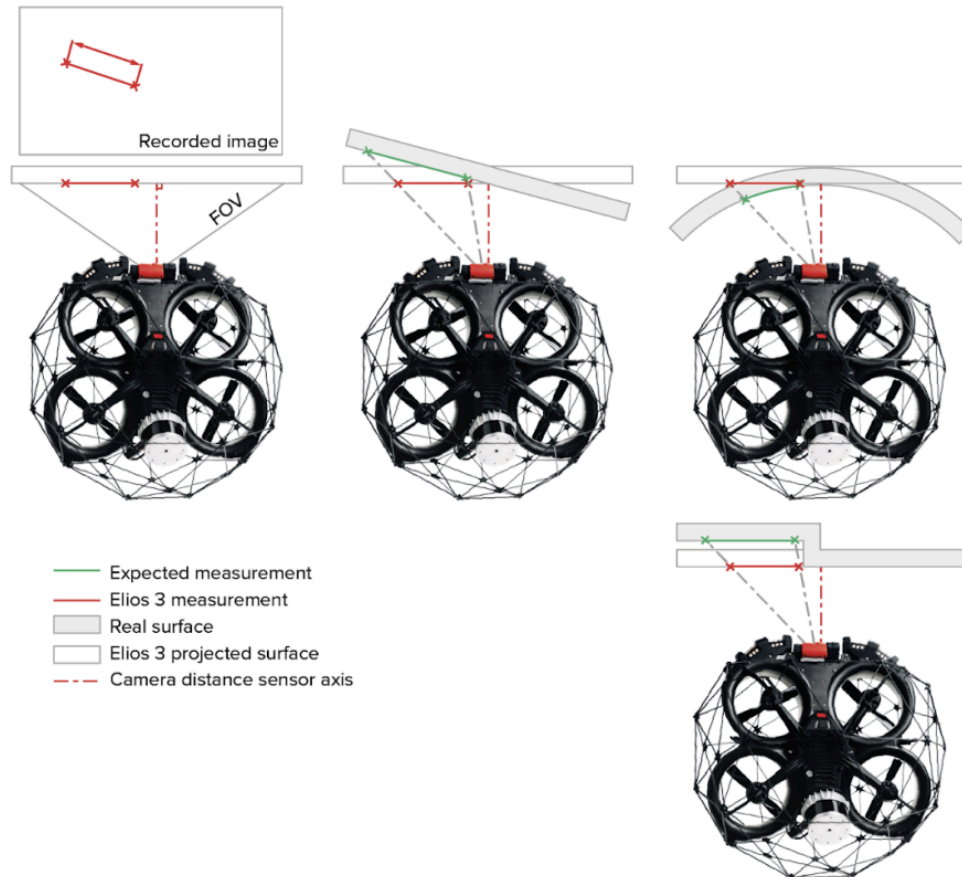
- Add Placemark
Specific areas on the image can be highlighted with placemarks. Click and drag to move an existing placemark, double click to edit the name or delete it.
- Add Line
Specific areas on the image can be highlighted with lines. Click and drag to move an existing line, double click to edit the name or delete it.



- Add Measurement

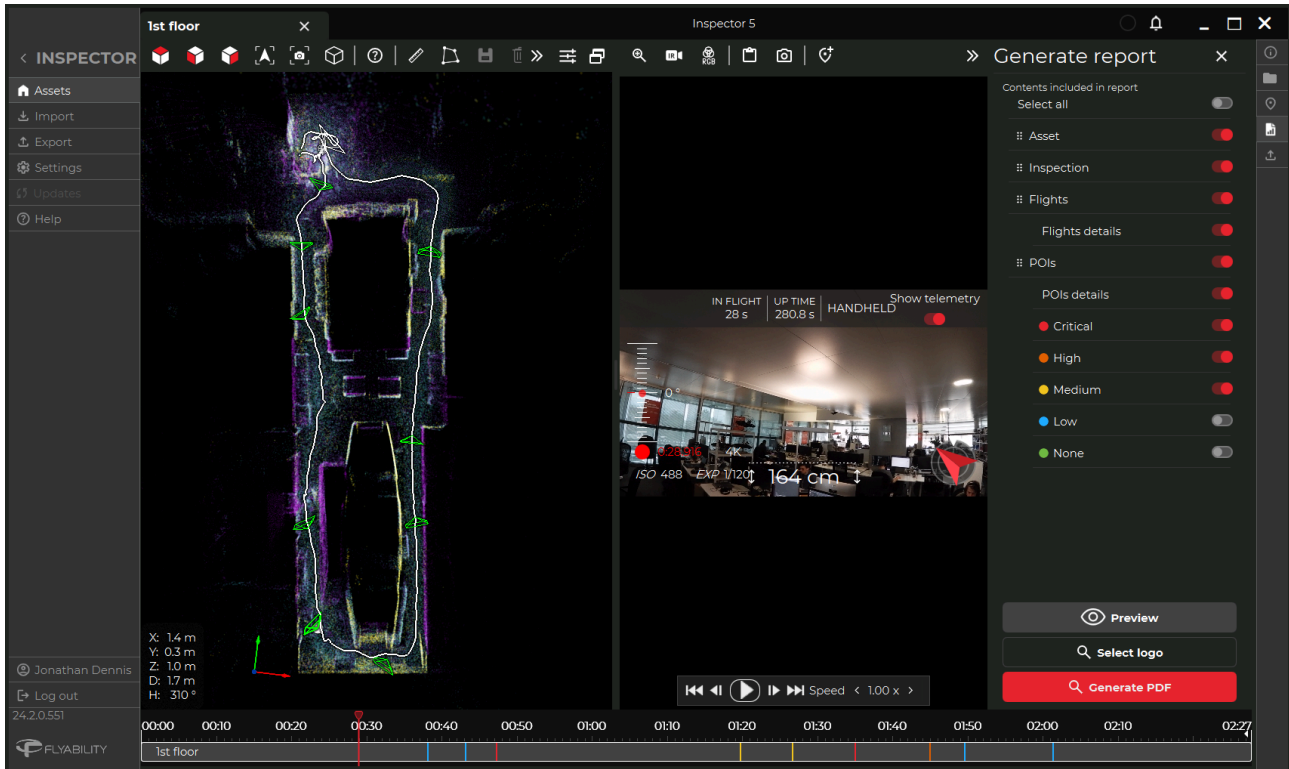
This feature uses information from the distance measurement sensor on the drone to make measurements using pixel calibration and triangulation. The measurement needs to be made on a flat surface perpendicular to the camera's optical axis. The accuracy of the measurement is $\pm 10\%$ of the measured length with a maximum of $\pm 5\text{mm}$ accuracy.

The 2D measurement result is displayed on the frame with its estimated accuracy. The button is grayed out in case of unreliable camera distance data.



The user must assess if the measurement makes sense by understanding its limitations. flyability does not guarantee the accuracy of measurements.

6.5. Generate Report



Inspector can generate a PDF report for the selected flight with the option to include Asset, Inspection, and POI information.

- Select contents to be included in the report. It is possible to arrange the order by click-holding the tab and moving to the desired order.
- Click on the **Preview** button to see a preview of the report.
- Click the **Select logo** button to add a custom logo to the report.
- Click **Generate PDF** to export and save.

6.6. Export

Export Data, or customized data for PIX4D, or FARO from the current folder.

Data

Export point cloud - Click the **Export** button to select a folder to export an .las file.

Export snapshots - Click the **Export** button to select a folder to export the snapshots.

PIX4D/Photogrammetry

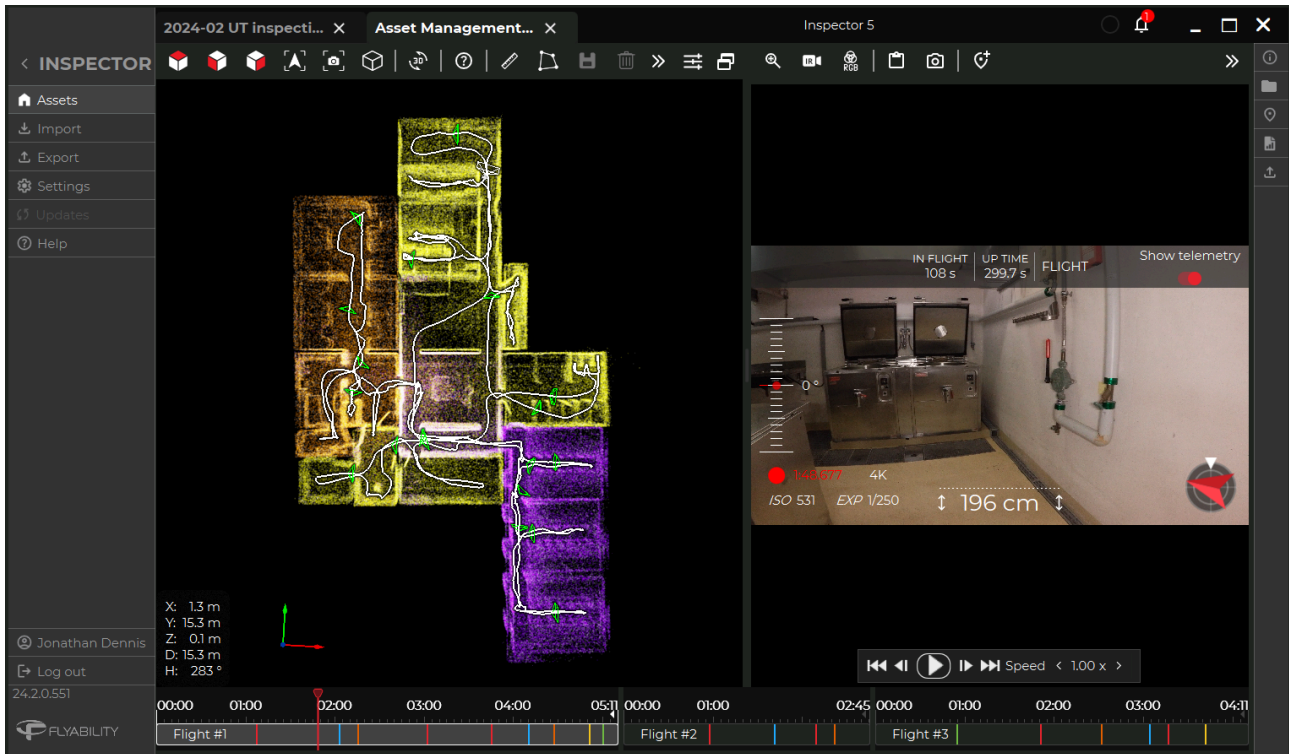
Extract images at a constant frame rate over a specified range of the video. These images can be used in photogrammetry software to reconstruct 3D models of the flight environment. Inspector 5 optimizes data for use with Pix4Dmapper, but any other photogrammetry software can be used that can process image files without GEOtags. Available settings:

- Select start and end point of video
- Select the framerate - Number of frames extracted per second. *Total* shows the number of frames to be extracted for the time frame selected.
- Export PIX4D project - Toggle to export a .p4d project file of all the frames extracted ready for opening in PIX4Dmapper.
- Export project templates - Toggle to export the project using a selected template.
- Select the Fast or Robust processing template.
- Click **Export frames** to export and save the data.

FARO

- Click **Export** to export data to FARO connect.

7. Inspection Flight Screen (Premium Subscription Only)



The Inspection flight screen shows a combined 3D map (colored by flight), flight video, and Points of Interest (POIs).

7.1. 3D map

View the combined point cloud created from the flights showing the path, and POIs taken. Clicking on a feature in the 3D map will cue the corresponding moment in the video timeline.



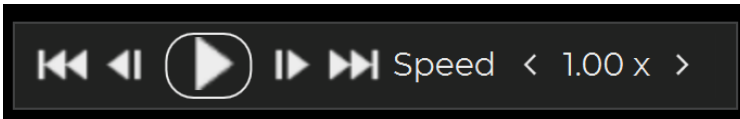
The 3D map toolbar contains:

- View from top - Click to view the 3D model from above.
- View from front - Click to view the 3D model from the front.
- View from the right - Click to view the 3D model from the right side.
- Camera around drone - The camera can rotate, but will always be locked towards the drone. This option is ideal to focus on the drone's current position without having to search for it.
- Drone Camera view - The camera is in first-person view (FPV), and is locked in the position of the actual camera of the drone. The pitch of the camera during the actual flight is also applied to the user camera.
- Switch Camera to Perspective or Isometric modes.
- Manual alignment.
 - Manually align active flight.
 - Accept or Cancel alignment.
- 3D Viewer Commands Description.
- Measure a Distance - Every two clicks to show the measured distance between two points

- Measure a Polygon Area - Number of consecutive clicks to select an area, display distances between points, and the surface value, as long as the points are approximately located on a flat plane.
- Save Selected Points - Click to save Measurement and/or Area selected.
- Reset Selected Points.
- View Settings.
- Separate window.

7.2. Inspection Flight Video

View the combined flight videos for the Inspection. Clicking on a point in the timeline will align the drone to the same point in the 3D map. The data and controls overlaying the video image can be toggled on and off by clicking the **Show Telemetry** toggle. Double clicking toggles full screen mode.



Video Controls

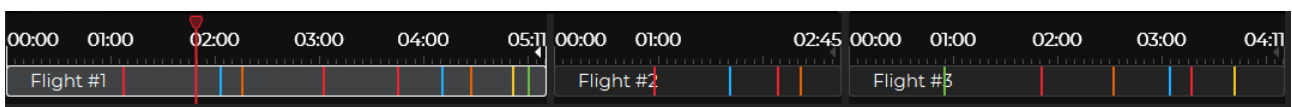
- Play or Pause the video (Space bar)
- Previous / Next frame (arrow left/right)
- Move to the beginning / end of the flight
- Set the playback speed.



The **Video Toolbar** contains:

- Zoom Control.
- Thermal video settings.
- Video Brightness/Contrast Settings.
- Copy current image to clipboard.
- Save current image to file.
- Add new Point of Interest(POI)
 - Name
 - Tags (ability to colorize)
 - Criticality level (ability to colorize)
 - Description
 - 3D Location coordinates.
 - View on map.
 - Save / Delete

Inspection Timeline

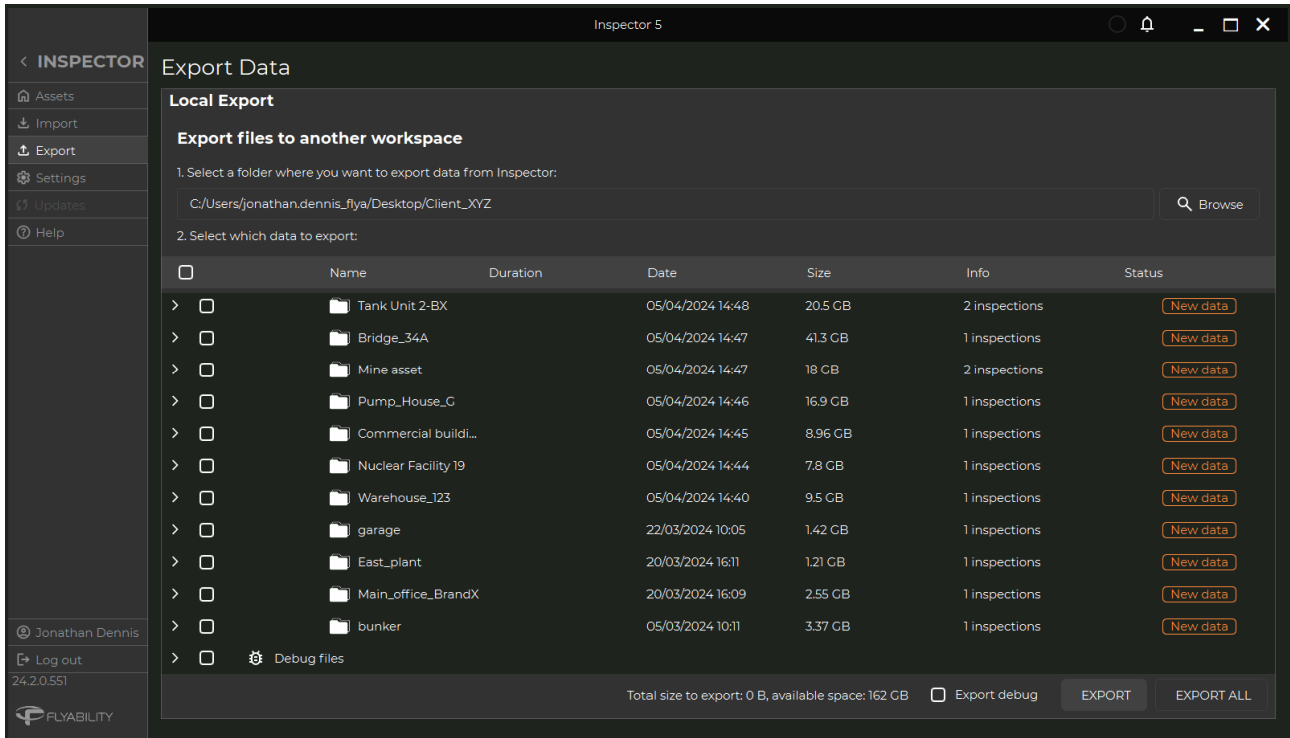


Contains all flights in the Inspection in chronological order. Clicking on a point in the timeline:

- Aligns the 3D map and video playback to the same point.
- When clicking on a Point of Interest(POI) - Shows the POI
- When Right-Click - Adds a POI

8. Export Data Screen

Use the Export data screen to export selected files to other workspaces and folders.

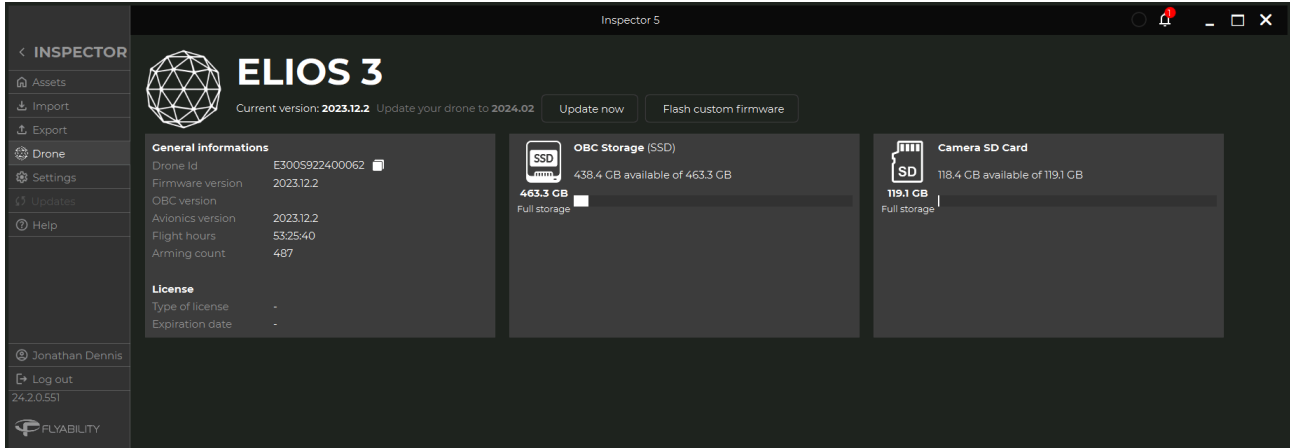


To export data:

- Select a folder to export the data from Inspector to.
- Select the data to export.
 - After an export folder has been selected, the workspace files will be visible for selection with the following data: Name, Flight duration, Date, Size, Info, and Status.
 - Select the appropriate checkboxes. It is possible to export full assets, Inspections, as well as individual flights. As selections are made *Total size to export / available space* will be updated.
- Click **Export** to export selected data. Click **Export All** to export all data.

9. Drone Screen

With a drone connected to Inspector 5, select the Drone tab to view information related to the drone. The *Current firmware* version installed is listed, and if there is an update available for update.



General information - Displays the Drone Id, Firmware version, OBC version, Avionics version, Flight hours, Arming count, License type and Expiration date.

OBC Storage (SSD) - Displays the storage available / storage used.

Camera SD Card - Displays the storage available / storage used.

9.1. Update Elios 3 firmware

Near the top of the screen, the current firmware installed is displayed along with the latest version for update when available. To update to the suggested version:


- Click **Update now** to install the suggested firmware.

It is also possible to install firmware versions manually using the Flash Custom Firmware button. With an available file for update:

- Click the **Flash Custom Firmware** button and select the appropriate file saved on the connected computer.

10. Other Menus

Additional menus and options are displayed in the upper right and lower left corner of the window.

- **Notifications** -  List of notifications. (top right)
- **Settings**
 - **Core Settings**
 - Unit system: Change the unit system in which flight data is displayed. The options available are: metric and imperial.
 - Radiation Unit: Change the unit system for the radiation unit. The options available are Sv, and rem.
 -
 - **Graphics**
 - Palette: inspector comes in a light and a dark color palette; we recommend you use the dark palette in dark environments, and the light palette in light environments, for it to provide you the best contrast.
- **Update** - Click to update Inspector.
- **Help** - Contains a link to the on-line support page.
- **User** - Shows the user who is currently signed in, click the exit icon to sign out.
- **Log out**- Click to log out.
- **About** - Installed version - Click the Flyability icon to review the License Agreement.

