AIRTEAM

DRONE PILOT GUIDE

DJI Fly App

AIRTEAM

Welcome on board

Airteam Aerial Intelligence is a company that develops software for surveying and inspecting buildings using aerial drone imagery. In your role as a pilot, you are responsible for creating the drone images for your projects. The images form the basis for inspecting and surveying buildings. We use our computer vision algorithms to create 3D models and survey and inspection reports for you from the images. In order for the algorithms to be able to process the data, a few things must be taken into account, which we explain below. In addition, all legal regulations that apply to drone flights in your area must be observed.

Requirements for the drone

Camrea resolution

Minimum 12
Ideal 20

MEGAPIXEL

Data format

JPEG

not RAW

Camera settings

AUTO

(ISO, WB)

Requirements for the images

In order for the software to be able to process the drone images, there are 3 basic things must be taken into account:

Image quality

The software can only analyse what is recognisable on the images.

Sections behind trees or scaffolding cannot be analysed.

Distance to object

Distance to the object 5 -10 m

that all details are clearly recognisable.

Amount of images

At least 50 images per circular flight

Images from all directions with sufficient overlap.

Checklist

Before the flight

- ◯ Location information and flight plan available
- ◯ Declaration of consent from the property owner (and neighbours if applicable) is available,
- ◯ Regional authorities and/or neighbours have been informed about the flight (if necessary)
- ◯ Arrangement of appointments with customers if they wish to be on site
- ◯ Type of flight known (e.g. roof measurement, solar, etc.) Keep an eye on the weather forecast for the day of the drone flight
- ◯ The date of the drone flight is correctly entered at www.airteam.cloud

During the flight

- ◯ All project-relevant data is included (e.g. declaration of consent from the property owner, proof of insurance, identity card)
- ◯ Choose a safe and quiet place for the drone to take off and land
- ◯ Take at least 50 images of the building per circle in "Hyperlapse" mode or manually (see procedure)

Also required for the survey report:

- ◯ 1 image taken directly downwards from 20 - 40 meters in the center above the building of the entire roof (nadir)
- ◯ Take 4 pictures of the entire building from all 4 directions

After the flight

- ◯ Upload all photos to www.airteam.cloud of the respective project.
  - Please upload photos of the Kreisfluges to the category 'Pictures - Technical'
  - Nadir- and 4 pictures from all directions please upload to the category 'Pictures-Aesthetic' category (only if a survey report is desired)
- ◯ Feedback to Airteam on the process, simplicity and effort of the flight so that future project processes can be developed and improved together.

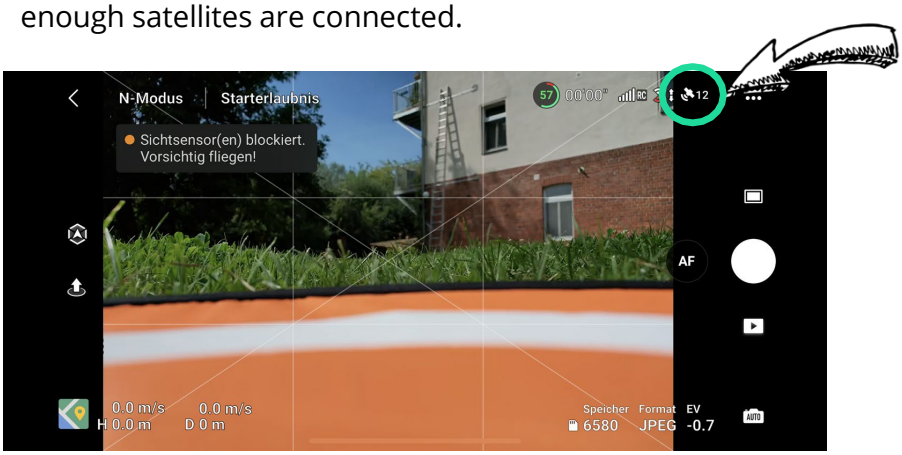
How to start the drone

1. Select take-off point

Choose your take-off point so that you can take off and land safely. Make sure that your take-off point is as open as possible, i.e. don't take off too close to buildings or trees!

2. Satellite connections

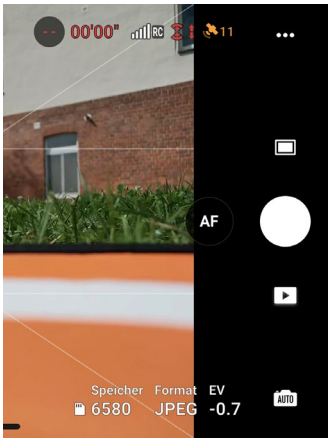
Switch on your drone and wait until the drone has at least 12 satellite connections. The announcement "The home point has been updated, please check it on the map" will sound when enough satellites are connected.



3. Take-off speed

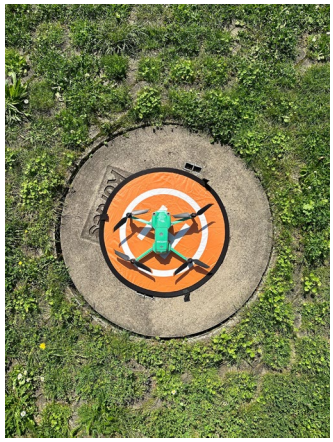
Start the drone at a moderate speed and wait a short moment before positioning yourself to take the picture.

4. Avoid the following sources of error:



GPS-Reception:
Do not take off until the drone has found 12 or more satellites.

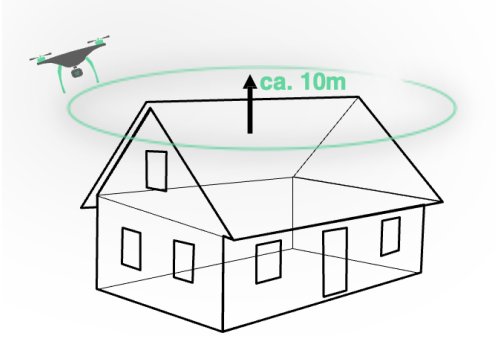
Too close to the building:
If the drone is too close to the building, the quality of the satellite connections drops and the drone takes a very long time to find 12 or more satellites.



Wrong underground :
Avoid taking off from a surface with metal (e.g. reinforced concrete), as this interferes with the drone's compass.

Procedure Hyperlapse - Circular flight

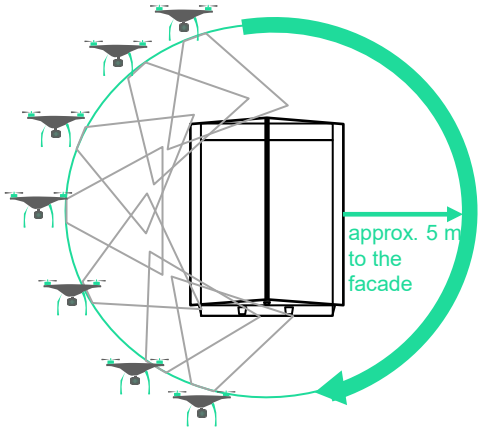
1. Step - Position the drone & align the camera



Fly the drone about 10 meters above the ridge. If the building is not too high, the ideal height is twice the ridge height. Now move the drone to a point where you can see one side of the roof clearly on the display with a tilt angle of the camera of approx. 45° - 60° - the focus is on the roof. The distance between the drone and the building should be about 5 meters.

2. Step - Select flight mode

Now select "Hyperlapse" in the photo settings and then click on "Circle". The app then needs a marker to circle around. Therefore, you mark the roof area by drawing a square over the roof area on the display. The app then shows you what you have marked. If this is correct, you can continue with the settings.



3. Step - Make settings

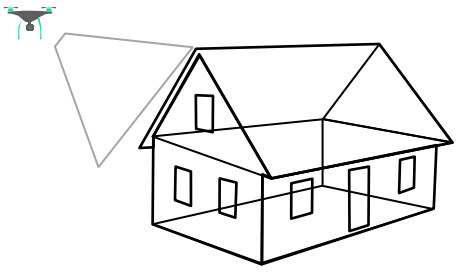
Select the time / duration (in seconds) with "3s" (75 images for a small circular flight) or "5s" (125 images for larger circular flights).

Make sure that "JPEG" is selected under "Format" at the bottom right of the screen.

4. Step – Start the flight

Make sure that the drone flies safely and does not collide. In addition, the roof must not be cut off at the edges. If this does happen, you will have to capture the missing edges manually with additional images. You can add flight time during the flight by clicking “+1” on display.

5. Step (optional) - Addition of facade images



If you also want to show the façade in high quality in the 3D model for your project, e.g. to measure the building height, you can take the pictures in such a way that both the roof and the façade can be clearly seen in the pictures.

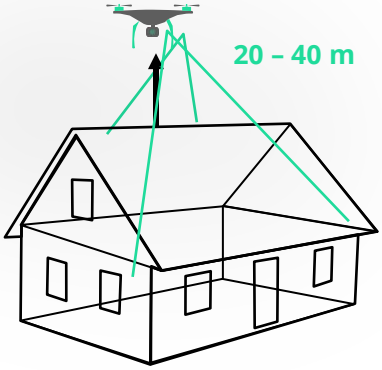
To do this, you can also make a circular flight for the roof and a second, slightly larger circle for the façade. Make sure that the images of both data sets overlap. Therefore, you must take photos manually between the last photo of the roof capture and the first photo of the façade capture so that the algorithm can recognize the connection between the two circular flights! They should also overlap for about 70%.

For more tips and tricks on facade surveying, there is an extra Airteam drone pilot guide!

Addition: Aesthetic images for survey report

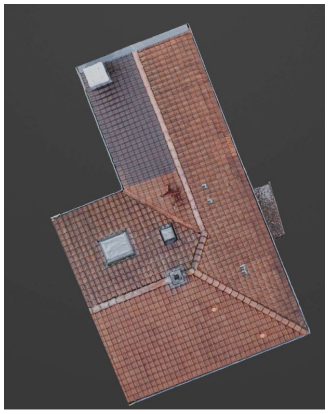
1. Step - Picking up the nadir

Fly the drone 20 - 40m above the center of the roof and set the camera tilt to 90° downwards. Now position the drone so that the roof is in the center of the display and take a single photo. Please note the maximum permitted flight altitude.



AT A GLANCE - Step 1:

Number of photos = 1
Camera tilt = 90° downwards
Flight altitude = approx. 20 - 40 meters above the roof

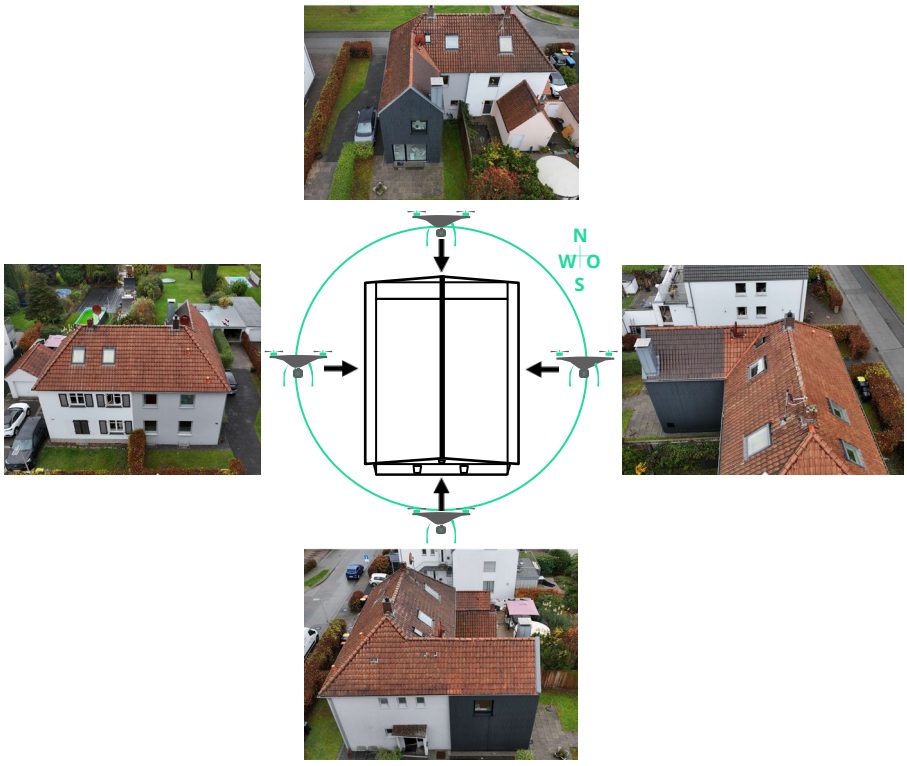


2. Step - Photo from all directions

Fly the drone just above the roof (approx. 10 m) and fly over the 4 sides of the building one after the other and take a single photo of the building in each case. The photos do not have to correspond exactly to the cardinal points, it is more important that you are as parallel as possible to the object.

AT A GLANCE - Step 2:

Number of photos = 4
Camera tilt = 45° - 60° downwards
Flight altitude = approx. 10 - 20 meters above the roof

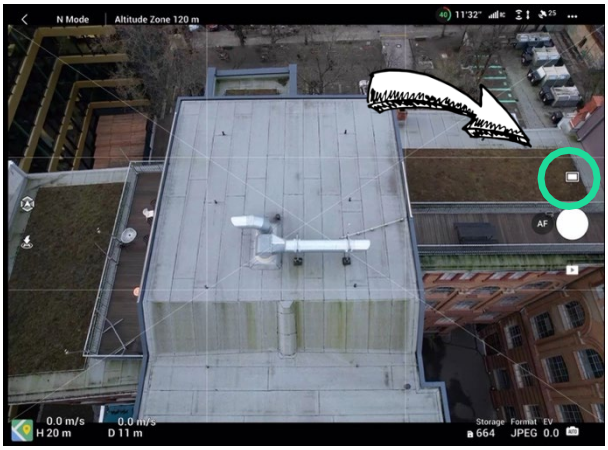


Hyperlapse - Flight instruction - DJI Fly App

1. Step: Position the drone

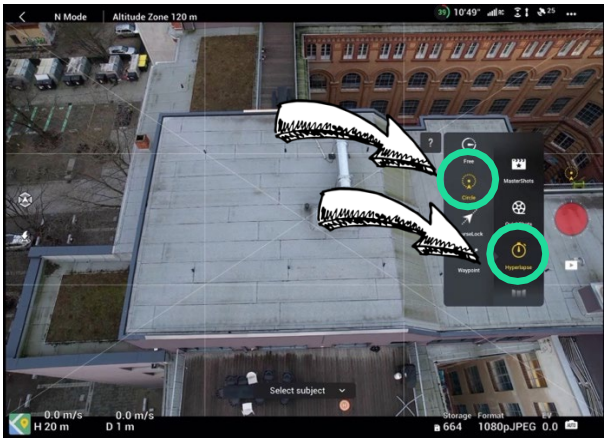
Fly your drone so that your roof is optimally visible (see photo). As a rule, this is the case at a flight altitude of approx. 10 meters above the roof surface. The angle of the camera should be between 30 - 60° (45° is ideal).

Press the photo/video symbol on the right-hand side of the display. A new menu with several options will then open.



2. Step: Select mode

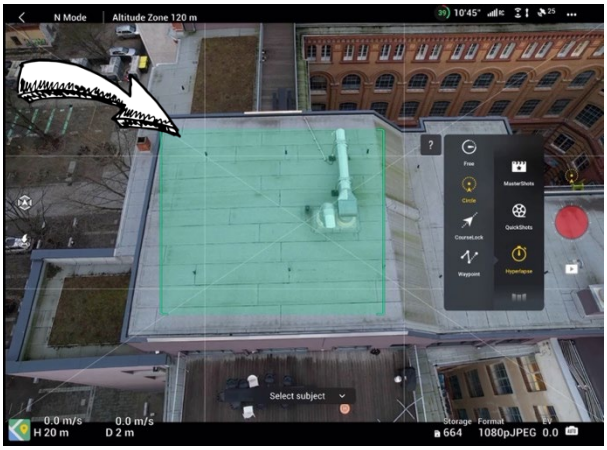
Scroll down and select the mode "Hyperlapse" mode. There are several options within the "Hyperlapse" mode. Select the "Circle" option here.



3. Step: Marking the roof

The app will ask you to mark the object that you want to circle.

To do this, draw a rectangle on the display with your finger. Mark the entire area that you want to measure/inspect.

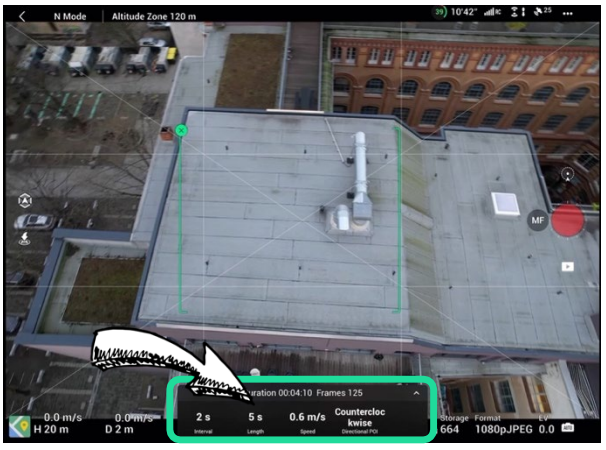


4. Step: Open settings

Once you have selected the object, another menu appears at the bottom of the display.

Here you can set the length of the hyperlapse or the number of images and the direction of flight.

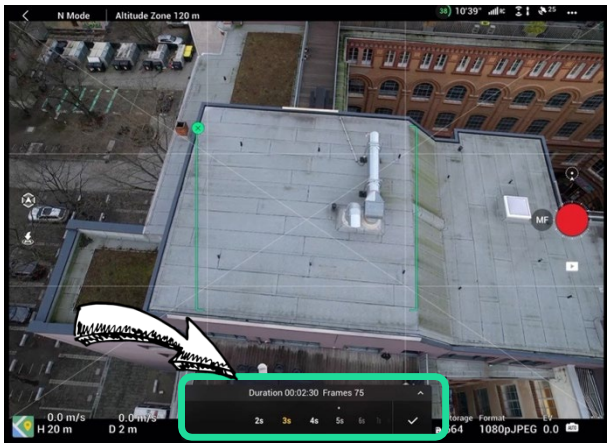
Tap on "Length" and another menu will appear.



Hyperlapse - Flight instruction - DJI Fly App

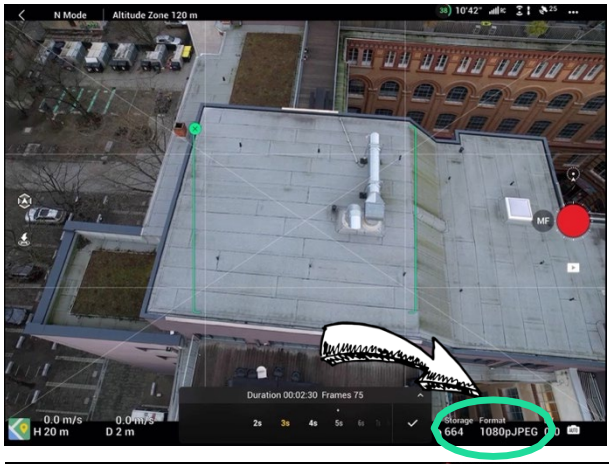
5. Step: Select number of images

Select "3s" here so that the number of images changes to 75 images per circle. For large circular flights with a radius > 15 m, select "5s" so that 125 images are taken.



6. Step: Open format setting

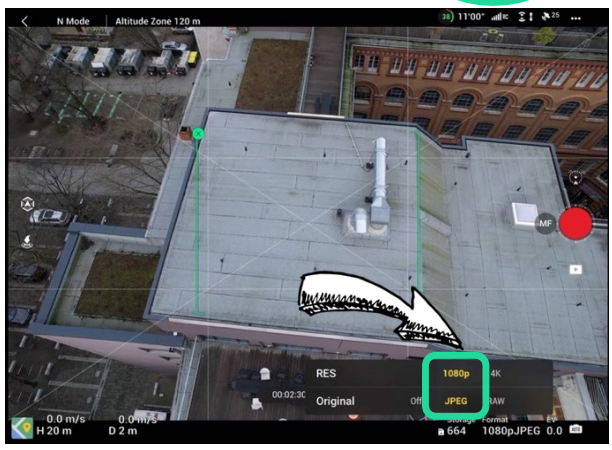
In the next step, click on the "Format" area. Another menu will then open.



7. Step: Change format

Now set each image of the hyperlapse to be saved. To do this, select the "JPEG" format here. This setting is not relevant for the video.

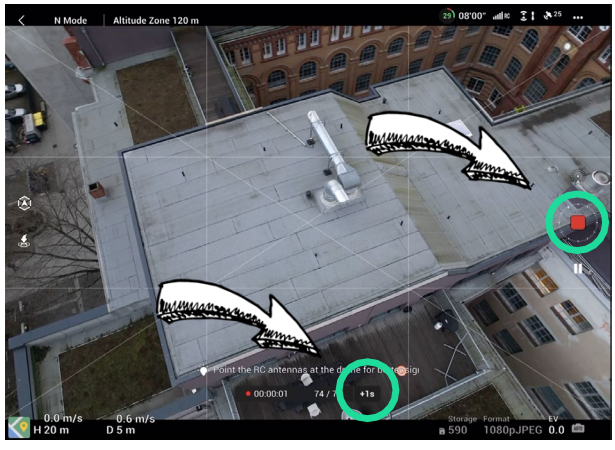
 Steps 6 and 7 are only necessary for the first survey flight, as the drone saves this setting.



8. Step: Start flight

Click on the red "Trigger" symbol on the right-hand side of the screen. The drone now starts the automated circular flight and takes 75 pictures.

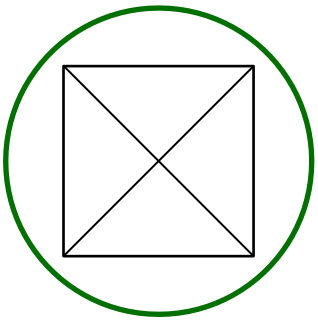
Please note that, depending on the radius, the drone may fly more than one circle or you may have to add more images. To do this, tap on "+1s" in the middle of the display shortly before the end of the circular flight.



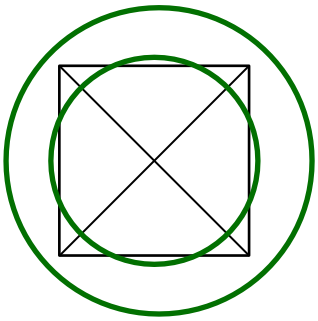
Flight paths

Flight paths vary depending on the type of building, the roof surface and the surroundings of the house. We have to make sure that we show every part of the roof in the pictures. Below you will find examples of trajectories.

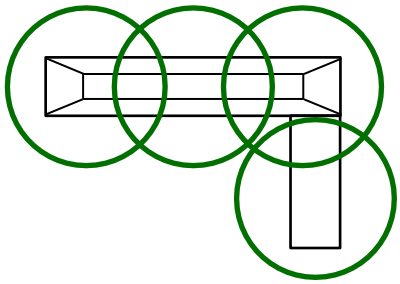
Small roofs
<150m² roof area
e.g. one-family houses



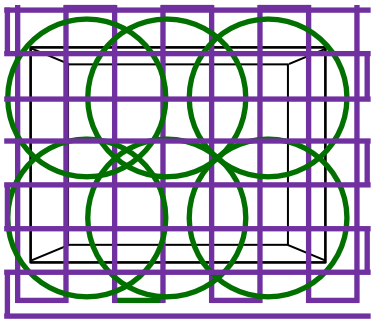
Medium size roofs
150m²<500m² roof area
e.g. multi-family houses



Big roofs
500m²<2.500m² roof area
e.g. Apartment blocks



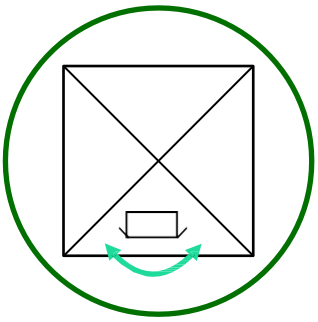
Very big roofs
2.500m²<15.000m² roof area
e.g. commercial halls



Please note:

- For roofs over 2,500m², we need a "double grid“ flight.
- For the double grid, the use of specialized flight planning software is recommended, such as e.g. DJI Pilot 2 App
- It is also necessary that you use a RTK drone, e.g. Mavic 3 Enterprise
- Please contact our Operations Team for further information.

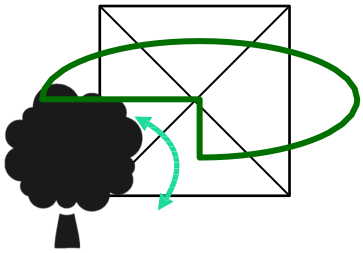
Dormers



Please note:

- End the circular flight and switch to manual flight mode
- Fly just above the dormer and set the camera angle to approx. 15°-30° downwards (note: it is important that you do not fly directly horizontally with a 0° angle).
- Set the multi shot to every 2 seconds and activate it.
- Manually fly a semi-circle over/in front of the dormer so that all sides of the dormer are visible in the images (approx. 10 images).

Overhangs/trees



Please note:

- Perform the automatic circular flight as far as possible. Adjust the altitude before and after the obstacle to avoid it
- Then end the circular flight and switch to manual flight mode
- Now fly in such a way that you manually capture all roof areas that you were unable to capture with the circling flight. Create several images of this area with overlap so that our software can process them in the 3D model. (min. 10 images).

Typical challenges

1. Obstacles

Please ensure that there are no obstacles such as trees or cables in the way. During circling flight, the drone flies automatically and always moves sideways. Many older drones do not have lateral obstacle detection, which automatically prevents collisions when flying in circles. If something is in the way, you must abort the automated flight before the obstacle and fly over the areas manually.

2. Blurred Images

Make sure that the focus of the image is on the roof and not somewhere else. With most drones, you can set or correct the camera focus by tapping on the display. This is necessary during the flight, for example, if you are flying several circles. A common problem is accidentally tapping on the screen, which sets the focus incorrectly.

3. Roof not in the center

Please check before each circle that the roof is in the center of the image and that at least 50% of the screen is taken up by the roof.

4. Camera angle

When flying the circles over the roof, make sure that the camera is at an angle of 45°. The camera angle is displayed to you in flight, so you can set it precisely. For dormers, you must fly downwards at an angle of 15° - 30°. This allows you to capture the front and sides of the dormers very well. A common problem is an angle that is too small or too large.

5. Circle size

Make sure that all parts of the roof are visible in the pictures due to the selected radius. A common problem is that the corners of the roof are not fully depicted in the images. It is better to have a few more pictures than no closed circular flight.

6. Manual Images

If the roof edges are cut off or if some sections of the roof or façade cannot be mapped using the circle flight, e.g. if trees are in the way, the missing areas must be mapped in manual flight mode. For a corner that is overgrown with branches, for example, we ask you to take several images (approx. 10) of the corner manually. To do this, please take the images from different perspectives and with an overlap to the previous images of the roof so that the software can combine them in the 3D model.

7. Not enough pictures

Depending on the size, 50 - 150 images should be taken for each circular flight. Please make the appropriate settings for this.

8. Aesthetic images, only for the survey report

In addition to the circle flows for the technical pictures, we ask you to take a picture from above (nadir) showing the entire roof and the property. To do this, we need one picture each from the north, south, east and west at a 45° angle, showing the entire building.

9. Exposure

If the sun is shining very brightly, the images quickly become too bright. This can lead to problems when creating the 3D models and the algorithms. Activate the overexposure warning in the camera settings. Areas that are too bright will then be displayed in black and white hatching. You can use the EV value to correct the exposure. Manual exposure compensation is only necessary in exceptional cases. For example, in strong sunshine, a dark roof and a white façade.

10. Legal regulations

For all flights, make sure that you comply with the legal requirements (which vary depending on the drone). These include having the consent of the property owners of all those over whose property you are flying (including neighbors if necessary) and flying the drone exclusively within the pilot's field of vision. You can find out more about this in the Airteam training courses and from certified bodies.