



Solar Inspections

In order to conduct a thorough solar inspection several critical aspects of the flight need to take place in order to be able to create an accurate visual represent of the array structure. During any solar inspection it is essential that the onsite pilot uses his or her best judgement when conduct complex operations. It is always recommended to have a visual observer and avoid flying the drone over people or vehicles.

- Determine the highest possible hazards that could impede an autonomous flight.
- Conduct preliminary site assessment to determine any obstructions or possible hazards for the drone pilot and drone.
- Ensure hardware is properly inspected prior to any drone flight operations.
- Ensure adequate software is available.
- Ensure proper battery charge to conduct inspection.
- It is recommended that solar inspections be conducted with the Matrice 210, Cadence Controller, and iPad with GS Pro, Drone Deploy, and XT Pro installed.
- Obtain permission to fly in the airspace.
- Confirm environmental conditions are suitable:
 - Skies clear and sunny or slightly overcast
 - Irradiance greater or equal to 600 Watts per square meter
 - Humidity ideally less than 60%
 - Wind below 6.7 m/s (15 MPH)

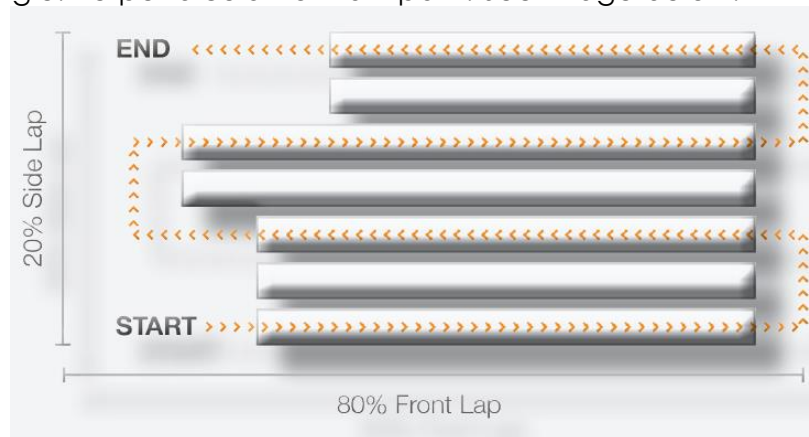
Inspection Steps

- **Equipment:**

- Drone: DJI M210 V2
- Camera: Zenmuse XT/XT2
- Mission Software: DJI Ground Station Pro (DJI GS Pro), installed on an iPad and plugged into controller. **Note: this software is available on iOS only.**
- Drone Capture Software: DJI XT Pro, installed on the same iPad. **Note: this software is available on iOS only.**

- **GS Pro Settings:**

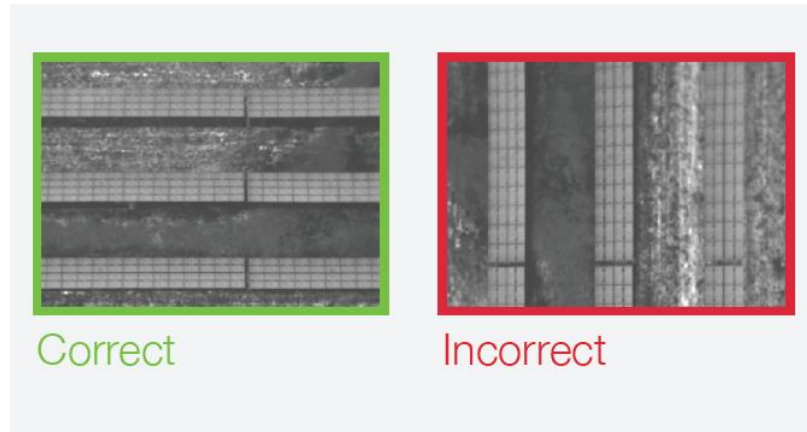
- Mission Type: Select a mission type of PhotoMap and draw a polygon around the area of the solar site you will be flying.
- Camera Model: Zenmuse XT/XT2
- Shooting Angle: Perpendicular to main path. See image below:



- Drone should fly side-to-side through the module rows as if it was crab walking.
- Capture Mode: Capture at equal time interval OR capture at equal distance interval.
- Speed: Shutter interval of 2 seconds
- Altitude: Generally, 130 to 140 feet above ground level.

- **Advanced Settings:**

- Front Overlap Ratio: 80%
- Side Overlap Ratio: 20%
- Course Angle: Run parallel with the solar panels. See images below:



- In cases where trackers are in use, drone needs to fly along the tilt angle.
- Mission Complete Set to hover - then fly the drone manually back to landing position.
- **XT Pro Settings:**
 - Palette: White hot
 - Isotherms: Set to off
 - Magnification: 1x
 - Spot Meter: Set to off
 - Field Correction: Set to defaults
 - Video Mode MSX
- **Camera settings in XT Pro:**
 - MSX Strength: Set to OFF
 - Photo Mode: Radiometric JPEG
 - Video Format: Not Applicable
 - Shoot Mode: Single
 - Region of Interest: Exclude none
 - Gain: Automatic
 - Scene: Default
- **Important Notes:**
 - When inspecting solar, always capture images as radiometric JPEG.
 - Drone is pointed north and pictures are being taken from left to right.
 - If there is a lot of tilt on the solar panels, you can also manually tilt up your camera to get better lined up with the panels.
- **Reference Videos:**

- <https://www.youtube.com/watch?v=gVIR5oEbDvQ>
- <https://www.youtube.com/watch?v=1nuPypFQ3nI>