

Case Study- How to inspect photovoltaic panels

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Spain is the seventh country in the world in number of installed solar power, according to a report by the International Energy Agency, increasing almost 30% in 2021. And the growth forecasts for this sector are exponential, according to the Government's plan for the Energy Transition focusing on renewable energies. But the maintenance and revision of photovoltaic parks requires the use and exploitation of technological advances for better performance.

Drones for inspections of photovoltaic panels are an alternative or complementary service to the traditional verifications or explorations of these solar panels, providing, in the long run, a longer useful life for the installations. At Aerocamaras we explain how we do this service.

Why should photovoltaic panels be inspected?

Photovoltaic panels or plates are flat structures composed of photovoltaic cells that are connected to each other and made of a semiconductor material. They are the elements that capture sunlight and in which electricity is produced.

The panels are installed in rectangular or diamond-shaped structures in the form of islands, equipped with a series of motors and systems that make them rotate and vary the angle of inclination from the beginning of the day (east orientation) to sunset (west orientation).). These structures are very susceptible to getting dirty with dust, rain, nesting or being damaged by external agents to which they are exposed, causing the appearance of cracks that affect energy efficiency or failures in the electrical connection.

The more complex the structures, the more inclination and orientation systems they have, the more maintenance and revisions they will need, but they all need at least one complete annual check by a specialized service.

Good maintenance of the photovoltaic panels contributes to lengthening the useful life of the structure.

Partners

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Aerocamaras, leading company in work with drones

Founded by Jaime Pereira Gil, Aerocamaras is a benchmark in the RPAS industry in Spain, a leader in drone manufacturing, training and services, Jaime being the sole shareholder. The work and leadership of the entire team that makes up Aerocamaras have led the company to be the leading drone operator in our country.

Drone operator authorized by AESA

More and more new technologies are being incorporated into different facets of society and drones are also being applied to more professional activities. Some sectors already work regularly with unmanned aircraft. Professionals such as those from the security forces (Police, Civil Guard or Army), emergency services (firefighters, water rescue or search and rescue teams), personnel in charge of carrying out technical inspections, topographical surveys and, of course, audiovisual projects already they know the possibilities of RPAS.

This industry is constantly growing and new applications for drones are appearing every time. This growth generates new professional opportunities for RPAS pilots. The savings in time and costs, together with the minimization of risks in different situations, make unmanned aircraft the best solutions in multiple situations. This has favored the growth of a company like Aerocamaras, authorized by the State Aviation Safety Agency (AESA) to operate drones in Spain and offer all these advantages to its custom

Proposed Solution

Aerocamaras

Inspection of photovoltaic panels with drones step by step

1. The first thing that is done in the inspection of photovoltaic panels is the planning of the drone flight throughout the plant. To do this, software with GPS is used throughout the entire structure since the inspection is carried out in an automated, consistent and precise way.

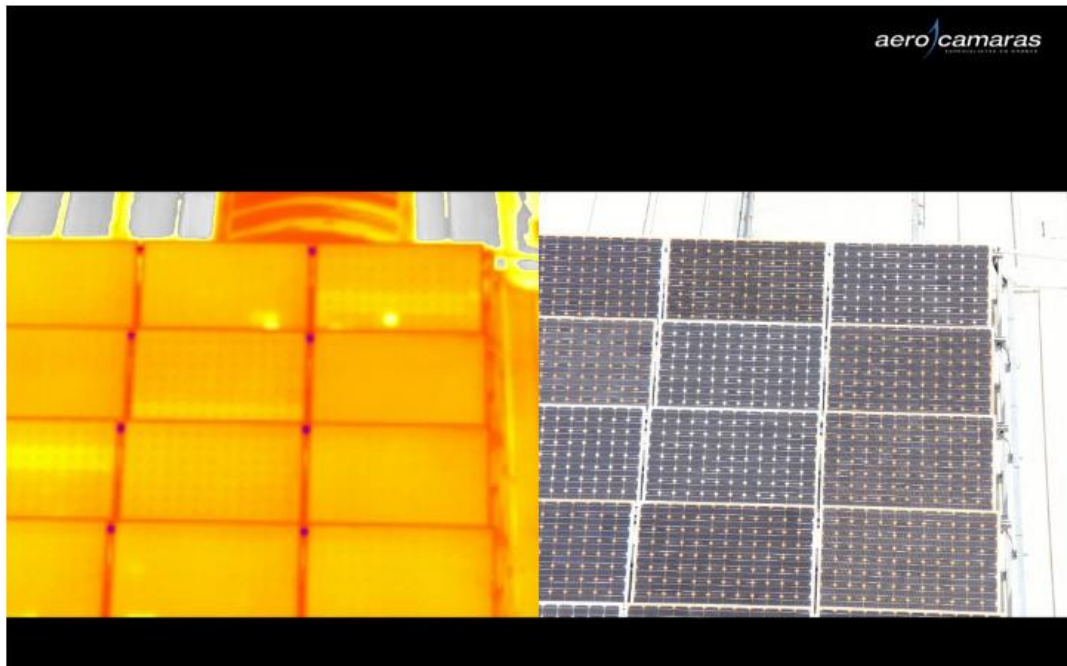
2. The process will begin with a general flight over the plant and then individualizing by panel sets (either rows or island groupings). It is done from one end to the other.

2.1. On the one hand, the inspection is carried out with a drone equipped with an HD camera that will determine the existence of accumulation of dirt, as well as the state of conservation of the metallic parts of structures, panels and other wiring.

2.2. On the other hand, the drone's thermal imaging (IR) camera will detect defective cells, usually defined as "hot spots". There may be several of these points located on the same panel and the IR camera indicates them with the color variation. In addition, it will serve to check the operating temperatures of the electrical circuits.

2.3. The drone or drones inspect the entire plant using aerial photogrammetry to verify the alignments of the structures and panels, as well as the operation of the orientation systems (in facilities that have such systems).

Data interpretation is then performed using AI from specialized damage reporting software. This system makes it possible to reduce the number of images required for analysis and the creation of optimized 3D reports.



Advantages of using drones in the inspection of photovoltaic panels

As we have seen, the inspection of photovoltaic panels with drones is not complex and allows us to check the state of the structure in a short period of time, in addition to the following advantages:

Reduction of the danger of the workers by avoiding direct contact with the cells for their revision. The drones carry out the inspection of the photovoltaic plants without the need for “in situ” supervision by the client or owner.

Reduction of review time and the logistics necessary to carry it out.

They reach areas of difficult access such as wiring.

They increase the efficiency and speed of any response action required. Generally, the instruments used for manual inspections are often very complex. However, reports from drone thermal imaging cameras simplify analysis and allow technicians to take corrective action sooner.

Cost reduction.

Drone services for the inspection of photovoltaic installations

Aerocamaras are pioneers in technical inspections with drones, being the first company in the world to perform this service with a drone with three recording sensors in the same flight: HD (high resolution/RGB); IR (thermographic, to detect hot spots); and UV (ultraviolet). Our pilots have carried out inspections of photovoltaic plants with UAS in Galicia and we also train future pilots to carry out said work.

Our drone teams have carried out technical inspection services for photovoltaic plants in the regions of Pirapora and Piau  (Brazil), one of the countries in the world's top 10 for renewable energies. This shows the increasing need for the demand for drone services for technical inspections.



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