

CASE STUDY

Inspecting during Substation Downtime

ABOUT US

Perceptual Robotics is a UK based technology company, focused on drone automation and AI services in the field of Wind Turbine Blade Management. Our services cover from field inspection to data processing and repair management. We and our Clients, have inspected and processed thousands of turbines and our systems are present worldwide.

OVERVIEW

During a recent project in the UK, our team inspected **56 wind turbines** in just five days under conditions that typically prevent standard inspection workflows. Despite having **no power on site** and **turbines being locked in random blade positions**, the mission was completed efficiently, safely, with high quality and without impacting energy production.

FIGURES

- **56 turbines** inspected in **5** days during complete power outage
- **0 hours of additional downtime** required for inspections
- **Full coverage** despite random blade angles
- Continuous operations enabled by **off-grid power solutions**

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THE CHALLENGE

The client faced a unique operational challenge: the wind farm was undergoing a planned substation downtime, meaning **there was no power to reposition turbine blades or recharge drone batteries**.

Traditionally, drone inspections require turbines to be positioned with one blade pointing up (12 o'clock position), achievable only when the wind farm is energized. In this case, the turbines were locked in random blade orientations, **making typical inspections impossible** without additional downtime.



Context

Random Blade Position
No Power in Wind Farm



Development

Inspect with Dhalion-Dot and AI assistance
Use DJI Power banks



NO POWER

To overcome the power limitation, as there was no power at all in the whole wind farm, the team relied on DJI power banks, allowing continuous battery rotation and uninterrupted flight operations throughout the five-day project.

RESULTS

This case highlights the operational advantages of combining flexible flight planning, smart autonomy, and robust field logistics to adapt to real-world energy sector challenges.

Number of

56

WTGs

Downtime

0h



Solution

Dhalion Dot system not only enhances operational resilience but also reduces costs and increases scheduling flexibility, proving that innovation and adaptability go hand in hand with real-world impact.



RANDOM BLADES

Using Dot technology (over an M350), we achieved consistent image quality and perpendicularity, in just 1 flight for all 3 blades, even when blades were in random positions (and not at 12 o'clock). This flexibility eliminated the need for creating an additional inspection window - meaning the client experienced no loss in generation time.

01

Initial Situation for most

Inspecting would have required 12 o'clock position and downtime

02

Our Approach

Use Dot technology and inspect in any position with full coverage

03

AI Data Processing

Damage Detection and Classification plus Repair Priority

04

Results

Quality images with full coverage and no downtime

USE CASE

With technologies like Dot, wind operators can perform inspections:

- **During planned substation downtimes**
- Under low-wind conditions **when repositioning blades is difficult**
- **Without creating additional downtime windows or losing generation**