



# skeye

aerial survey & inspection

Gemini Challenge: Blade Inspections at night  
29<sup>th</sup> November 2018



prodrone  
infrastructure inspection solutions

## The Challenge

### Description of the challenge

With the larger far offshore wind parks, the SOV or CTV remains in the wind park during night time, and there is a 24 hrs. crew on board. During the day the crew is fully utilized, but from 20:00 to 5:00, there is a possibility to utilize the CTV or SOV for 'easy' tasks like blade inspection. Gemini would like to explore the possibilities to inspect blades in the dark by using drones, or another innovative method.

### Our solution

Skeye from the Netherlands and Prodrone from Portugal have developed a solution that allows for fully autonomous and automated wind blade inspections at night. Our payload with drone will automatically and autonomously create photo's of all edges of the blade within 40 minutes for each wind turbine.

The photos will be uploaded in the 'Blade Insights' software, which structures all photos for inspection based on a 3D model of a windmill. Through computer learning the software will identify 80%-90% of all defects, enabling a robust and efficient analysis for the inspection.

The lighting for the solution needs to be developed, and the regulatory hurdles needed to be overcome. This could be completed within a short period of time.



## Technical specifications

### Fully autonomous blade inspections

by ProDrone from Portugal and Skeye from Netherlands

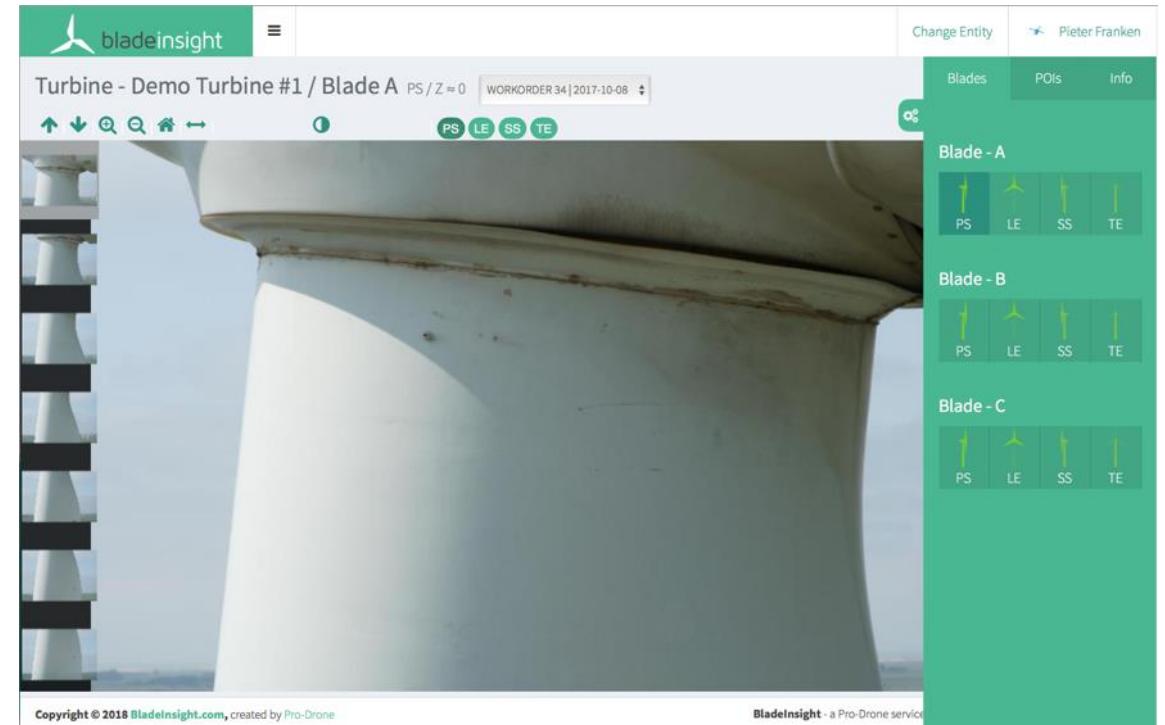
### A combination of proven technology and customisation:

#### ProDrone fully automated inspection payload

- Autonomous flight of the 4 edges of a blade
- Laser aided distance measurement
- 42 Mp high resolution camera
- Fits on a standard off the shelf drone
- Successfully tested on 2200+ blades (onshore and offshore)
- Presentation of sorted results in an online portal
- Artificial Intelligence aided defect identification

#### Customisation for the Gemini Challenge

- Adding a light source for night inspection
- Obtain an exemption from regulator to fly outside daylight hours



## What needs to be developed

*The remaining challenges are feasible to overcome within a short timeframe:*

### Technical matters

- Current navigation solution already works in the dark; remaining challenge is automated pictures **need to be lighted** appropriately.
- Lighting solution for the payload need to be developed and trade-off weight versus battery capacity.
- Focus on off-the-shelve drone platforms.

### Regulatory matters

- Drone flights are **currently not permitted** outside Uniform Daylight Period according to the current Drone Regulations in the Netherlands.
- New European Regulations **make it possible to request approval** for a special scenario
- The request for a special scenario must be accomplished by a SORA risk assessment
- From the risk assessment special operating conditions and mitigating measures can be implemented.
- Skeye is very familiar with the SORA methodology as we are in the advisory board as well as the expert group for SORA implementation with the CAA.



## Comparison to other methods

Rope Access



Ground Camera



Manual Drone



Our solution



Costs / Day	€ 2500	€ 1200	€ 2500	€ 2500
Turbines / Day	2	8	4	7
Costs / Turbine (*)	€ 1250	€ 150	€ 650	€ 360
Turbine downtime	3 hours	1 hour	2 hours	40 min
Costs Turbine downtime (**)	€ 2700	€ 900	€ 1800	€ 600
Offshore Suitability	✓	✗	✓	✓
Data quality / consistency	✓	✗	✗	✓
Safety	✗	✓	✗	✓

(\*) Excl. (vessel) transport and turbine downtime

(\*\*) Based on € 900 per hour

## About Us



### Leading drone service provider

- First certified Dutch drone operator
- Over 7500 commercial flights
- Offices in NL, UK and Belgium
- Part of the Terra Drone Group
- ISO 9001 / VCA / ISO 18001
- Audited by Shell / Exxon / Lloyds / CAA's



### Clear frontrunner in the blade inspection sector

- Focused on system development
- Founded in 2015
- 2 years of development
- 2200 + blades inspected to date (0 incidents)
- Developed online inspection software
- Automated flight and AI assisted analytics deployed

### Track record



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