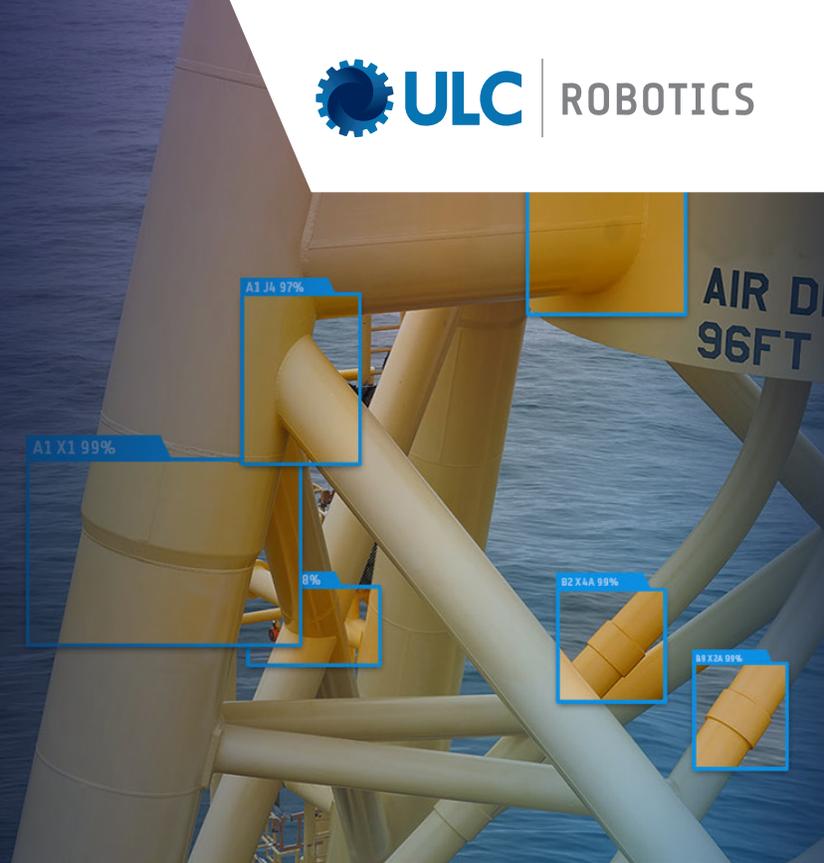


CASE STUDY

USING AI & UAS TO INSPECT OFFSHORE WIND TURBINE FOUNDATIONS



EXECUTIVE SUMMARY

In September 2019, ULC Robotics’ Aerial Services division completed its second annual inspection of the five offshore wind turbine foundations located off the coast of Rhode Island. Automated flight operations and machine learning enabled ULC’s UAS pilots to perform the inspection of all five jacket foundations, capturing and processing more than one thousand images to satisfy the requirements of the customer.

CHALLENGES

Conventional methods of inspecting the offshore wind foundations:

- Expose workers to risk, climbing at heights above sea level
- Are labor-intensive, and can require 6 hours of inspection time per foundation
- Do not capture all data points, due to inaccessible areas or inconsistent photography

Additionally, traditional methods of data analysis:

- Can take substantial time to manually process, review and sort all data
- Can result in inaccuracies, as manual data review is just 95-97% accurate

ULC proposed a detailed flight plan using automated operations to deliver comprehensive inspection data to detail the condition of all key inspection points.

CLIENT: Orsted, Keystone Engineering

INDUSTRY: Offshore Wind

BUSINESS AREAS ADDRESSED:

- Corrosion
- Maintenance

SOLUTION IMPROVED:

- Safety
- Data quality
- System performance and reliability

RESULTS:

- 100% data capture
- Delivery of high resolution imagery of all key inspection points
- Data rapidly processed using Machine Learning

Using our custom-developed hexacopter UAV outfitted with a high-resolution 42MP DSLR camera and HD video camera, ULC’s Aerial Services team provided detailed images and reporting on all inspection points as outlined by Orsted.

- High-resolution images of all key inspection points across each of the five foundations
- 100% data capture by ULC, with 360° insight enabled by aerial views, in approximately 1.5 hours versus 6 hours per foundation manually

In addition to **automated flight and data capture**, ULC Robotics developed and implemented a **machine learning** application to rapidly process all images captured during the inspection process.

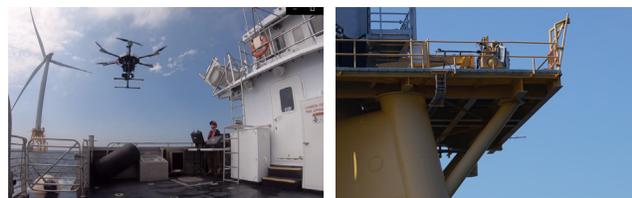
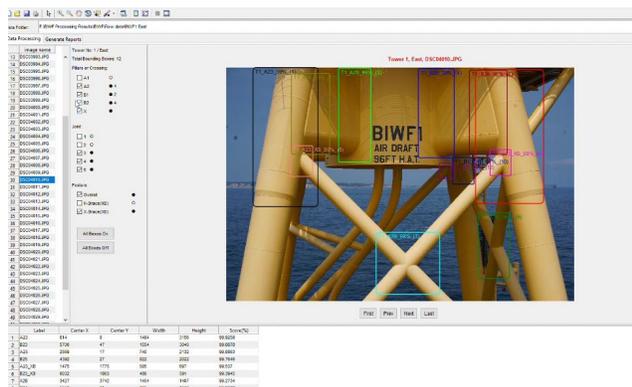
- ULC’s machine learning model can be used to rapidly process the data
- Raised accuracy of data analysis to over 99% through machine learning
- Provided the client with an interactive cloud-based portal for detailed data review
- Enabled better analytics and predictive models for comparative analysis when reviewing previously captured data

AIRCRAFT:
ULC Custom-Developed
Multirotor

PAYLOAD:
42MP DSLR
HD Video Camera

FLIGHTS:
Flights per foundation: 1
Total flight time: 90 min

AIRSPACE:
Class G



ULC AERIAL SERVICES

From proactive asset monitoring to facility security, our team of experienced UAV pilots, engineers and project managers work with electric, gas, and energy companies to deploy unmanned aerial systems while focusing on delivering high-quality, actionable data.

Contact us to learn more about our UAV Inspection Services: 1-631-667-9200 / www.ulcrobotics.com