

# Remote inspection: A remotely controlled robot installed inside wind turbine nacelle.

## Innovation description

A remotely controlled robot intended to be installed on a rail inside the nacelle of wind turbines. Collect information from inside the nacelle either autonomously or on demand, and present information to operators on land. Current sensors are high resolution camera, thermographic camera and microphones, intended to mimic what a human would sense at site.

Norsk Automatisering AS (NAAS) develops Remote Inspection as a new product and service. Development of a high fidelity prototype and real life testing has been performed by NAAS as part of the NOWITECH spin-off project LEANWIND (EU FP7, 2013-2017), and through a User-driven Research based Innovation (Brukerstyrt innovasjonsarena - BIA) with NAAS as project leader, 6 other project participants, including 1 PhD and 1 Postdoc at NTNU.

## Further development

A reliable and modular aluminum monorail solution suitable for mass production, for accurate positioning of robot, is under development at NTNU Department of Engineering Design and Materials.



Screenshot of collected sensor information from a pilot installation at VIVA test center



High-fidelity prototype presented at EWEA 2016 in Paris

## Impact

- Reduce the need for manned inspections (reduced cost and improved worker safety).
- Ability to investigate automated alarms and warnings before sending personnel to the site, and identify "false positive" alarms.
- High quality sensor information are stored and can be used to follow the state of equipment and detect changes over time.
- Can be used for planning of maintenance operations, to make sure that the correct equipment and expertise is available before an operation is started.

## References

Ø. Netland, G.D. Jenssen, A. Skavhaug, *The Capabilities and Effectiveness of Remote Inspection of Wind Turbines*, Energy Procedia 80:177-184, December 2015

J.M. Farstad, Ø. Netland, T. Welø, *Evaluation of Undesirable Deformations in Complex, Hollow Aluminium Extrusions due to Roll Bending*, 19th ESAFORM Conference, 2016

Norsk Automatisering AS web page:

[www.norskautomatisering.no](http://www.norskautomatisering.no)