

# New coatings for leading edge erosion of turbine blades

Author: Aidan von Bonin<sup>1</sup>, Astrid Bjørgum<sup>2</sup>, Sergio Armada<sup>2</sup>, Nuria Espallargas<sup>1</sup>

\*<sup>1</sup>) Norwegian University of Science and Technology, Trondheim, Norway

\*<sup>2</sup>) Sintef Industry, Trondheim, Norway

Benefits of offshore wind turbines are:

- stronger, more stable winds,
- larger turbines with higher tip speed,
- reduced noise regulations,
- no near housing etc.

➤ Thus the power output increases

However, stronger winds result in severe erosion on the leading edge of the turbine blade.



Image 1: Leading edge erosion (<http://www.hogrehojder.se/vindkraft.html>)

Leading edge erosion is the mechanical degradation of the turbine blade due to the impact of particles and raindrops at high velocities.

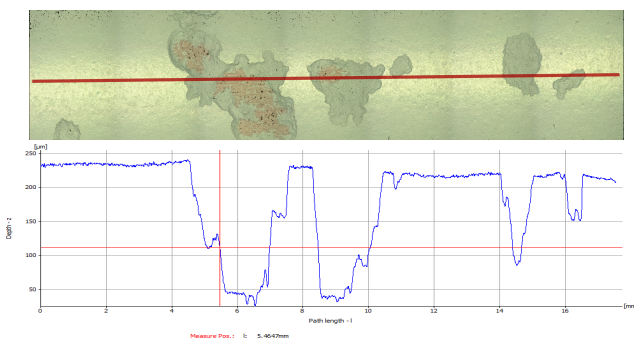


Image 2: Surface scan and profile of tested rain erosion sample.



Image 3: Offshore wind park (<https://de.wikipedia.org/>)

In this project:

- we evaluate and characterize coatings systems,
- develop a multi parameter test machine.

Combined with results from partners and data from a wind park operator we research the reasons and develop solutions for leading edge erosion.

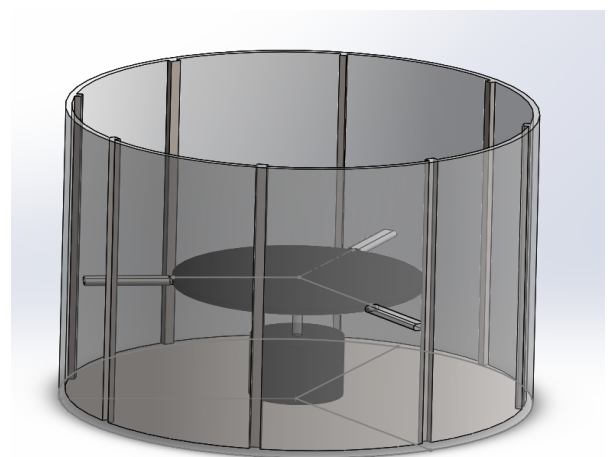


Image 4: Schematic design of a rain erosion test machine.

A test machine is being designed and build to simulate leading edge erosion. Parameters such as velocity, temperature and rain density, among others, will be variable.

The goal is to get deep understanding of the phenomenon and design, and develop stronger, more reliable and longer lasting protective coatings.