



MODERNIZATION SOLAR

# Wind turbine rotor system





## Overview

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How can large wind turbine rotors reduce energy costs?

Large wind turbines yield more energy but demand careful aeroelastic blade design. Coupled multiphysics design strategies can reduce wind energy costs by exploiting fluid-structure interactions. This work presents the first high-fidelity aerostructural optimization study of a large wind turbine rotor.

Why should wind turbine rotors be optimized?

The design and optimization of wind turbine rotors, therefore, remain pivotal in improving energy capture, reducing costs, and enhancing the overall performance and reliability of wind energy systems.

Is a wind turbine rotor a high-fidelity aerostructural optimization study?

This work presents the first high-fidelity aerostructural optimization study of a large wind turbine rotor. We use blade-resolved fluid dynamics and structural solvers in a monolithic gradient-based optimization framework to explore steady-state torque and blade mass tradeoffs.

What rotors can be used in a wind turbine?

Instead of using a very large rotor, smaller rotors can be used in a wind turbine. As an example, a multi-rotor wind turbine—Vestas 4R-V29 located at the Risø Campus of Technical University of Denmark is shown in Fig. 1.



## Wind turbine rotor system



### How a Wind Turbine Works

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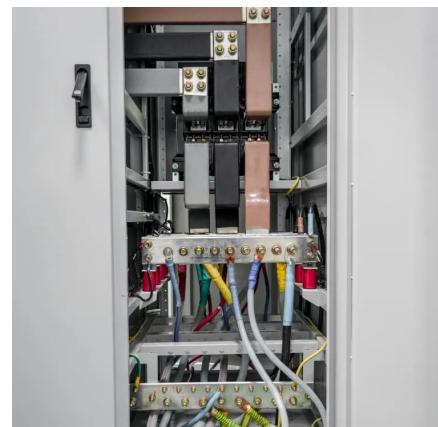


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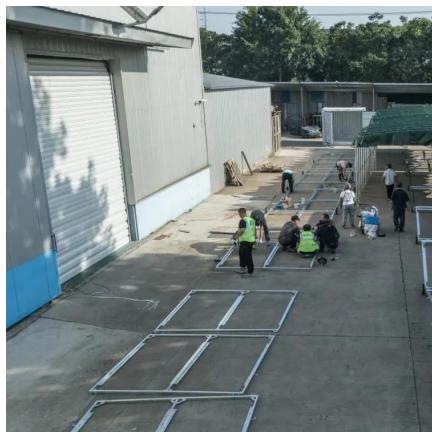
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