University of BRISTOL
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ACCIS ADVANCED COMPOSITES COLLABORATION FOR INNOVATION & SCIENCE

Optimal Aeroelastic Tailoring of Wind Turbines

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This work utilises multi-disciplinary optimisation (MDO) to investigate the levelised cost of energy benefits from embedding aeroelastic tailoring within wind turbines.

A comprehensive & robust MDO tool is employed, performing rapid aeroelastic simulations to ascertain power production and system loading. Gradient-based optimisation is employed.

The present case study is the design of a 20 MW turbine system. The baseline is the INNWIND 20 MW reference wind turbine. Results for a conventional tailored and sweep tailored turbine are presented.

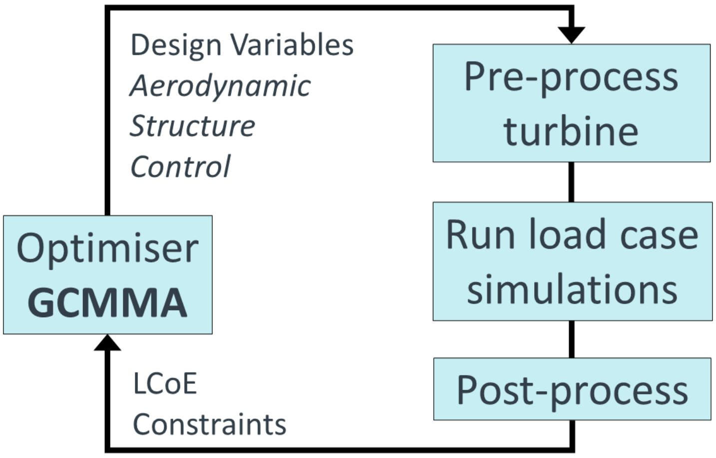

Figure 1 – The monolithic optimisation framework.

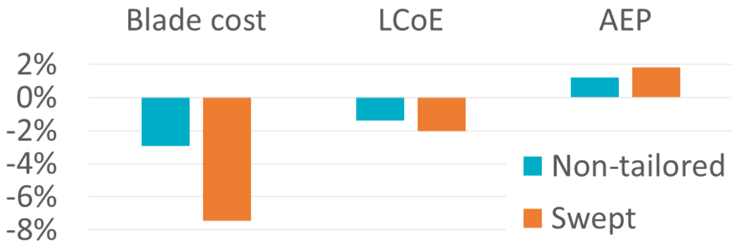

Figure 2 – Overall metrics. Percentage difference relative to INNWIND.

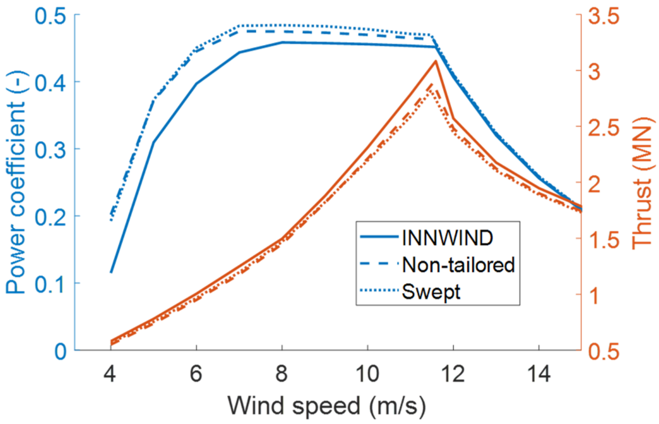

Figure 3 – Cp and rotor thrust comparison.

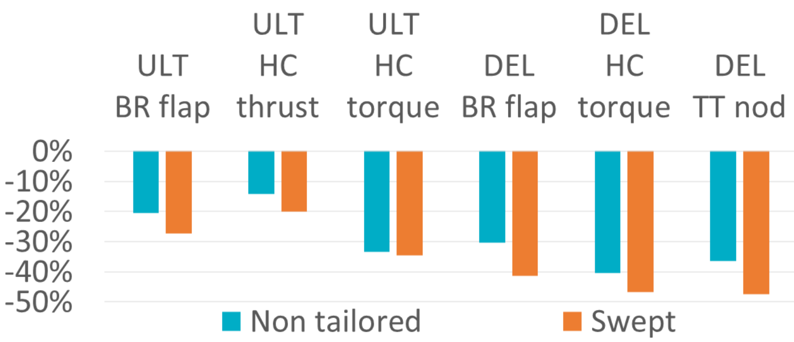

Figure 4 – Design driving load components compared to INNWIND.

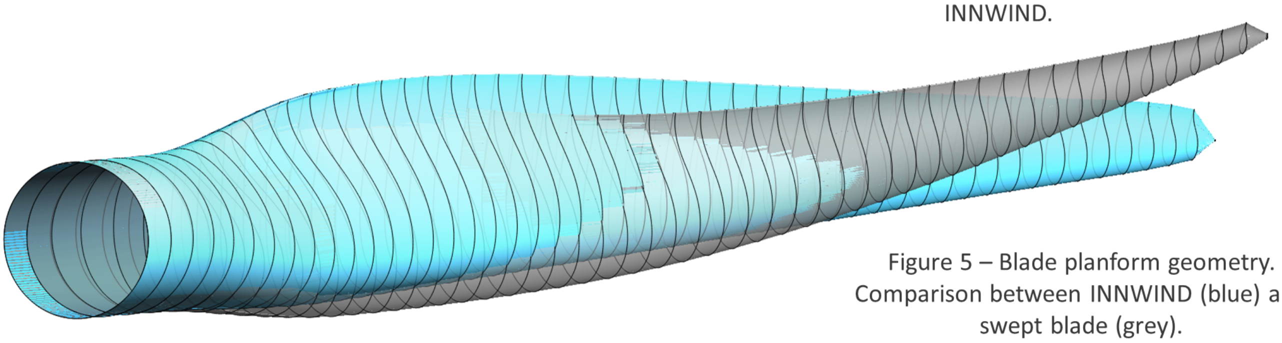

Figure 5 – Blade planform geometry. Comparison between INNWIND (blue) and swept blade (grey).

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