Reply to Reviewer 2

General Comments

This papers describes the effect of a slat on the aerodynamic performance of a thick airfoil commonly used for wind turbine rotors near the hub. The experimental results include lift and drag, pressure distributions and flow visualization.

The paper is well written and the scientific quality is very good. I have some general remarks:

Thank you very much for your thorough review and valuable feedback. We have addressed your points, as indicated below in colour.

I would like to see a comparison of the pressure distribution and lift and drag values of the baseline airfoil with data from the literature. This would help to validate the experimental setup.

We have modified Figs 5, 7, 8 to include the results of Xfoil and compare with the experimental Cl and Cd curves for the clean main airfoil alone. Note that Xfoil is expected to be reliable in the linear part of the Cl polar. Hopefully this gives some confidence in the experimental setup.

The pressure distribution on the slat is measured with only 11 pressure ports which is a low resolution. Did you make an assessment on the possible error on the lift computation?

We have computed the Cp distributions with Xfoil and compared integrating Cp on the whole profile against integrating Cp from the data at the 13 pressure tabs only (we have corrected in the text that we used 13 tabs instead of 11). The integration error is about 11%. We have added to the manuscript as follows: "Also, the low number of pressure tabs on the slat leads to an integration error of about 11\%. This is quantified by comparing the integration of C_p values from Xfoil along all the slat coordinates with the integration considering only the data at the locations of the pressure tabs."

Section conclusions: I miss some recommendations based on the observations on when and how to apply slats on airfoils (guidlines).

This is clarified by summarizing the best slat angle and gap width as found in the study.

Specific comments

69: I would insert a reference to Fig 2. here and highlight the hexagonal rod in Fig 2.

Done.

Fig 2: It would be helpful to include the locations of the 11 pressure ports in the figure in order to understand the pressure distribution.

The location of the pressure tabs (corrected to 13) is indicated by red dots in Fig 2 (left).

87: Based on which knowledge was this position chosen: x/c_main=0.35?

This location is chosen as a compromise between increasing lift coefficient and reducing the associated drag penalty. This is now added to the text. Some internal confidential tests (company-related) confirmed that this location is good but we cannot provide more information on this unfortunately.

134 & Fig 5,6 etc: As you state that for alpha > 20° the results should be disregarded, I suggest to eliminate these data from the plots in the related figures because they are misleading and you would increase the resolution in the plots.

All the figures of Cl, Cd, and Cl/Cd have been re-generated, omitting the data points at alpha>20deg that cannot be trusted. Plot resolutions have also been adapted.

132: „Therefore, a possible reason for this small disparity could be related to three-dimensional wall effects“ Did you observe this with the tufts? I'm asking because later you state „tuft visualisations demonstrate that the tuft visualisations demonstrate that the flow is rather two-dimensional as expected (Fig. 8)“ which implies that you observed some three-dimensionality…

The tuft visualizations indicated that the flow is rather 2D. We checked this up to alpha=11deg. Unfortunately, we have not checked the tuft visualization at exactly the alpha=13deg condition, which is the only case for which we have this disparity. We know this does not come from the airfoil surface and that this observation was repeatable. However, we could not pinpoint exactly the cause of it.

143: "For larger angles of attack, the drag coefficient is reduced due to the presence of the slat". I see that the slat configuration represented by the red dots has a larger drag.

Indeed this was a mistake in the text and is now corrected. The drag should indeed be larger in the presence of the slat.

Fig. 8: Which flow conditions are used here? Re, AoA etc…

*The photo was taken at Re=1.5*10^6. Unfortunately, we have not noted the exact AOA. We have modified the figure title with: "Example of tuft visualisation <u>obtained</u> for a clean <u>airfoil</u> (i.e. no tripping) with a slat at $Re=1.5\cdot 10^6$ and a small angle of attack."*

204: I have a hard time recognizing this statement in Fig 15: "Also, the presence of the slat leads to a more uniform flow on the main airfoil". What do you mean by "uniform flow"?

This is rephrased as "Also, the presence of the slat alleviates flow separation on the main airfoil"

Technical corrections: typing errors, etc.

109: comma after "Pre-stall" is not needed

This is rephrased as "The drag coefficient pre-stall…" to increase clarity.

111: "Therefore, post-stall, the pressure lift and drag are used" This sentence reads strange.

This is rephrased as "Therefore, post-stall, the pressure measurements on the airfoil and slat surfaces are used instead."