The authors would like the reviewer for his efforts in helping us improving the paper!

In this paper, the authors present a methodology for selection (or really, downselection) of load cases related to finite element analyses of a pitch bearing design. It presents a nice contribution on the topic of pitch bearing design. The paper has been extensively revised, mostly with respect to communication of the approach, methodology, and results, based on previous reviewer comments. With that, I still have a few minor comments that came up on a re-read of the manuscript – most of which relate to the FE results.

Abstract

• Line 12: I'm not sure I understand the meaning of "supposedly" or what the "signals" are in the new sentence "It uses the standard deviation of supposedly dependent signals to determine the necessary number of bins." As is, the sentence would commonly be understood to mean that the conventional thinking is that these signals were dependent, when the authors have found that they are not – or the authors are not sure whether they are dependent or are not dependent. Is that the intent? Maybe it depends on which "signals" are referred to – do these mean the blade root loads, the somewhat vague "load components" mentioned in the previous sentence, or something else? I have a sense that the relationship between the loads for each of the 3 blades is being addressed here, but I don't quite understand still. I think this relates to Section 2.4, but after reading it I'm not sure I understand. In terms of a well-written Abstract, I think this sentence could be improved to say something like the following:

o "It uses the standard deviation of blade root and hub loads from one blade to determine the necessary number of bins." Or…

o "It uses the standard deviation of blade root and hub loads from each blade to determine the necessary number of bins."

Note that I may not have the technical details correct in these suggested sentences, but that's the point. I do also note that the Conclusions section does not include any mention of "supposedly" or even "dependent" or "independent".

In colloquial terms our vein of thought behind that statement was: We first assume that signals depend on each other and then check this assumption with the standard deviation after binning. Instead of 'assume' we used 'suppose', and as to the signals we did not use 'load components' because there is also the very important (geometrical) signal of the azimuth angle. So just referencing to loads is not correct, wheres 'blade root bending forces and bending moments and hub bending moments and rotor azimuthal position' gets a bit long.
We appreciate this explanation falls short of what we are doing and is misleading. So, we have re-written this part of the abstract (again). It now uses 'degrees of freedom'

throughout the entire paragraph to avoid confusion, and we give a more detailed explanation fo the leading hypothesis which was missing from the earlier version.

Definition and Methods

• Section 2.4: I think this section relates to the bit about "supposedly dependent" in the Abstract, but I'll admit I can't understand what is being communicated here. I'm still puzzled by "The result values are arbitrarily chosen". Maybe this is all relatively down in the weeds so-to-speak? Is the level of detail here needed? That is, is a table of "fake" values meaningful? If I'm the only reviewer having trouble here, feel free to ignore me on this matter, but I am definitely not getting it beyond that there is some process used to bin the loads.

Albeit the data binning process is simple, we found it worthwhile to explain the stacked data binning process behind the later result tables. We are uncertain if this is common knowledge in which case it can be omitted. The reviewer has a good point in the arbitrary values being misleading. We have replaced the values with an excerpt from the case study and added an explanation of how these values are processed for the later result tables.

Though not directly suggest in the reviewer's comments, we have also moved the subsection on calculation of missing signals to the appendix. There was some confusion from within the group of reviewers as to why these explanations are part of the paper. We have clarified this with a leading statement and think the placement in the appendix suits it much better.

Case Studies

• Figure 7: Much improved. I know I can zoom into it electronically, still, I would recommend increasing its size.

The authors are particularly proud of the legends being left of the graphs without any overlaps with the data. It just took a few hours to get there. The reviewer is very right in the figure deserving to be a bit bigger, we have increased its width to 14 cm.

• Lines 225-228 and Figure 9: I like the addition of accompanying text prior to the figure that explains the contact forces and stress field, but I have some suggestions that might help the average reader:

o Missing I believe from this description is that the bolts apply compressive loads to both rings. This, I think, is an important point that should be added and would help to explain the blue area in a portion of the bolt hole FE result.

A very interesting remark. We have mentioned before that the stresses are tangential, but now added an additional clarification that we are looking at tangential (or hoop) stresses which are pure tensile on the outer ring. The bolt pretension does only have a minor influence in this stress direction.

o Line 227: related to that, is a better sentence here "The outer ring, however, experiences tensile stresses that overcome bolt compression and larger deformations than the inner ring." Is that a correct understanding of the FE result?

We have rephrased as 'the outer ring experiences tensile hoop stresses' . These do not have to overcome the bolt pretension because they act perpendicular to it, but the reviewer is right insofar as the bolt pretension has a minor influence on them.

o Figure 9: it would be quite nice for the average reader if there were 4 arrows added to each ball representing the total contact force at each contact in the figure.

• Lines 229-237 and Figure 10: I was initially very confused here about the description of angles and axes. Based on that, here are some suggestions:

o Line 229 and caption of Figure 10: add to the end of each "…for a full and one-third rotor simulation over one rotor revolution." This clarifies what the x-axis of the plot is.

This is a very good idea, we have added it.

o Change the text regarding the 90 degree and 270 degree positions as these are circumferential locations on the outer ring, not a rotor azimuthal position on the x-axis of the plot. Change text for positive and negative y-axis, as these are for the little figure on the right, not the plot. I don't believe identifying the exact circumferential position on the outer ring (90 degree and 270 degree) is really needed, nor the little plot at the right needed.

I think you could just describe these as two different locations on the outer ring circumference (location #1 and location #2) or if there is something special about them, say that (leading edge and trailing edge, for instance, or top or bottom).

We have rephrased the leading description. The added sketch of the position was on the request of another reviewer so we are hesitant to remove it again.

Having said that, I think the points were chosen because what is labeled the 90 degree position is point in the bolt hole with the maximum stress overall throughout the hole, all other points in all other holes, and over all rotor azimuthal positions (as it's normalized maximum is 1….which is near 90 degrees rotor azimuth by chance – at least I think it's by chance!) and then the 270 degree position is just another example chosen because it is

the maximum stress within the bolt hole on the opposite side of the outer ring (with its maximum near 270 degrees rotor azimuth by chance – at least I think it's by chance!).

Well it is not perfectly by chance because M_x moments are driven by weight. At 90° and 270° rotor position the blade is almost horizontal and the pure weight component of M_x is at its maximum.

o In line 236, is the understanding of the meaning here better stated as "The amplitude of the stress cycle in the bolt hole for the one-third rotor model is 9.25% lower than the full rotor model.

Thank you, this is much better.

This results in a significant difference in outer ring structural fatigue life and demonstrates the importance of cross-influences of the blade loads."

Thank you so much.

As you see, I made minor edits here that I think draw out the importance of these sentences. Is it correct? Is the 9.25% based on the difference in the peaks at 90 degrees rotor azimuth – it seems to be. In this case, I would call it "The amplitude of the maximum tangential stress in the bolt hole for the one-third rotor model is 9.25% lower….". Or, alternatively, is the 9.25% based on the height of these peaks (about 1.0 and 0.9) compared to the minimum stress (about 0.05). Is that why "stress cycle" is used in the sentence? Either way, is this the first time a result like this has been demonstrated, or are there also previous papers that have quantified this that could be cited here?

We think this is the first time something like this has been published though to our knowledge the major manufacturers are aware of this difference.

As you can see, I am quite interested in these statements as outer ring cracks initiated near bolt holes seem to be a major problem in the industry right now, and this plot and bit of text here seems to relate to it. Am I making too much of it? I know it's not the subject of the paper, but I do like it.

Now, your conclusions are right. The step from one-third to full rotor is absolutely necessary to produce realistic results. This is a simple truth and as said above we assume it to be well known in the industry, but it hasn't been published so we wanted to mention it here.

• Line 237: I am lost by the sentence "The Φr,B, azimuthal positions of the extreme stresses match those of the extreme Mx,B,1 during the rotation." In Figure 8, I see that

the maximum value of Mx,B,1 occurs at roughly 90 degrees rotor azimuth position. What is currently labeled as the 90 degree position on the outer ring (again, coincidence…I think?) has a maximum stress at something like 110 degrees rotor azimuth position (not 90). Even more confusing, what is labeled as the 270 degree position on the outer ring has a maximum stress at something like 250 degrees rotor azimuth position (not 90). Should I read this sentence to mean "The Φr,B, azimuthal position of the maximum tangential stress in the bolt hole on the outer ring matches that of Mx,B,1 shown previously in Figure 8"?

You are right that our conclusion was a bit generous. There are slight deviations in the exact position of the maximum M_x and the maximum stress. We have rephrased the explanation and given a bit more detail.

Minor grammatical recommendations:

• Line 14-16: I believe a better reading sentence here would be "The azimuth angle and blade root bending moments allow determination of the loads at all three blade roots and stress-time series with 384 simulations of a full rotor to a reasonable degree of confidence."

Absolutetly true, this would be a better read. It would omit, however, the information on which azimuth angle we are talking about (we think the nacelle yaw changes its azimuth angle as well) and that we are taking the loads of one single blade to determine those of the other two. So we do agree it lacks elegance, but would rather keep it that way for precision.

• Line 77: Here "to which extend" should be "to which extent".

Thank you!

• Line 105: "bases upon" should be "is based on".

Thank you

• Line 169: "deviations of between" should be "deviations between".

Thank you!

• Line 189: The figure reference needs to be fixed.

Thank you again.

• Line 221: There is a double "with with" here.

Thank you so much.

• Line 227: There is a double "The The" here.

Yes!

• Line 239: Should be “…finite element simulations.”

True

Thank you very much again for taking the time to read through the entire paper. We highly appreciate it!