

Interactive comment on “A review of wind turbine main-bearings: design, operation, modelling, damage mechanisms and fault detection” by Edward Hart et al.

Edward Hart et al.

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Dear Jonathan,

First, on behalf of all the authors, I would like to thank you for taking the time to read our paper and provide valuable feedback.

With regards to rolling versus plain bearings - this is a good point and you are correct that we need to make sure this distinction is clear in the article. We will discuss whether to stick with a focus on rolling bearings, while indicating the existence emerging plain bearing use, or alternatively whether to expand the paper somewhat to include plain

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bearings more fully.

With regards the discussion in Section 1 - thank you for pointing out these additional references which include information about main-bearing failures that we had not picked up on. We will make sure to include them in the revised manuscript.

With regards to Section 3 and the principal role of main-bearings - yes this is a fair point. The intent was to highlight that the main bearing is always supporting the rotor and contributing to the reaction of non-torque loads - however I agree that in its current form the sentence implies this role is exclusively performed by the main bearing. We will amend this for the revised manuscript.

For section 4 and GE and DD - good point, we will do as suggested.

For Section 4.3 and 'bearing units' vs 'bearing rows' - We take your point, however there is maybe some room for confusion here (for which we might need to reword a bit to avoid). A three point mount has a single bearing 'unit' which will commonly contain two bearing rows within it. A four point mount system has two bearing 'units' again with either one or two 'rows' within each of them. When discussing the WTMB in this section we are referring to the whole ensemble of either one or two entire bearings for the three and four point mount cases respectively. We will go away and consider how to make these distinctions as clear as possible, and will consider re-wording if necessary. Having explained our intended meaning I would be interested to hear your thoughts on whether a clarification will clear this up, or whether this ensemble description should maybe be re-thought.

For Section 5.2 - thank you, another helpful resource and reference. We'll add this in.

For Section 5.3 - good point, we'll add this in.

For Section 6.1 - This wording was intentional in just focusing on friction at this stage. Tribologically speaking the wear is a result of increased friction, but, only guaranteed if certain other factors relating to material properties are also present. The distinction is

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somewhat academic but was felt to be important. We will however re-discuss this for the revised manuscript.

For Section 8 - I agree that having spoken to industry members it is clear that temperature monitoring has been allowing for successful fault diagnosis. However, we have not found published materials documenting this beyond what is presented in Section 8. This makes it difficult to include a more detailed discussion of its merits. We will have another look through the literature in case any new references for temp monitoring can be found. - in terms of removing Section 8 from the paper, from discussions we have had with both academics and industry members we are aware that, for quite a few parties, the diagnostics and prognostics for bearings is actually their principal interest when it comes to this topic area. As such, I don't believe such a review paper would be complete without these topics being included. We will of course still be happy to expand the other areas of the paper to include your suggested additions.

In terms of recent works - It is important that we find these references we may have missed. We actually finished and submitted this manuscript just before the TORQUE 2018 and some other conference proceedings became available and so there are indeed a few new items in those that we will add into the revised manuscript. We will also look through the other sources you have mentioned. In terms of whether main-bearings have been neglected or not - 'neglected' might be a bit strong, however, it does still seem to ring true when main-bearing research is compared to that of gear-boxes and generators etc. However, we don't want to do a disservice to what good work has been going on and so we will revisit this terminology and perhaps dial it back a bit.

Thank you again for your valuable comments and if you have any further questions or comments I'll be most happy to respond to them.

Best regards,

Edward Hart (Corresponding author)

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