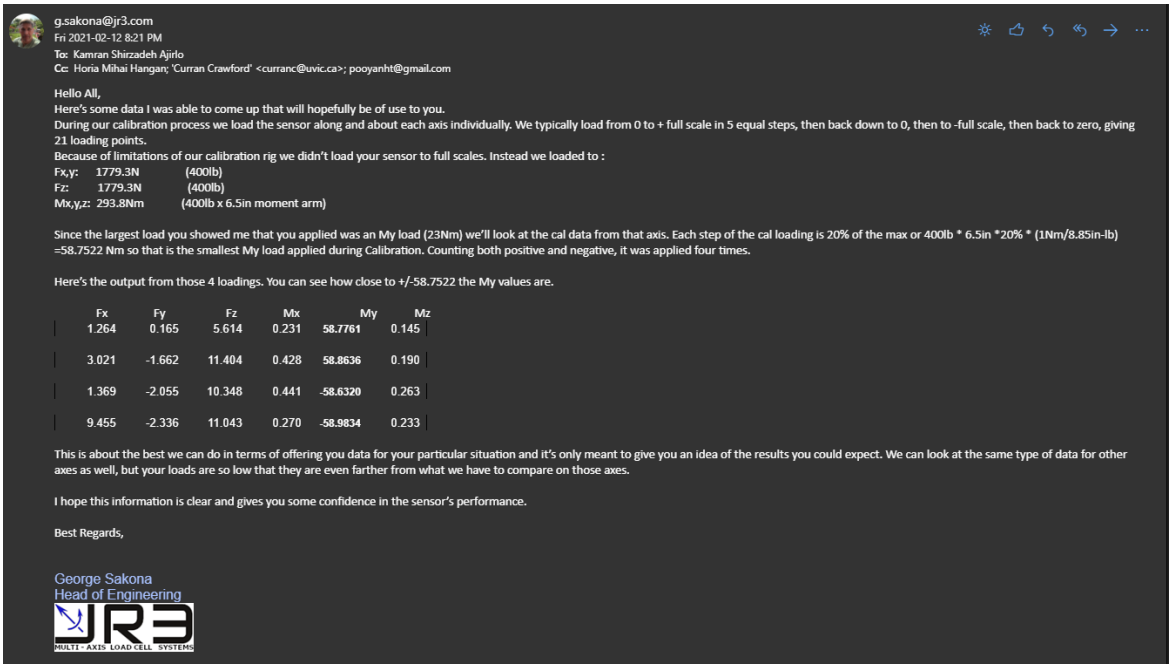
RC1

Please find point by point response to your comments in the following:

- **The force balance information is misleading, a clarification of this is necessary.**

We have contacted the JR3 company about the accuracy of their sensor and we recognized that we are dealing with high uncertainties in our values. As per our request, they made a calibration test just for the Y moment (Fig. 1). They exerted plus and minus 58.75 Nm on it two times each. The result show +-0.12 Nm accuracy in average which is a lot lower than what the datasheet suggested. As the company previously mentioned to us those values (datasheet) are the worst possible accuracy that you might expect. However, many changes have been made to recognize this in the text including removing all the smaller loads with unacceptable uncertainties. Now just the X force and Y moment are being presented. For horizontal shear, the additional Z moment has been presented to show the yaw moment on the structure mentioning this value associates with a large uncertainty. The turbine itself is heavy and relatively large so installing it on a smaller and more sensitive force balance was not possible.

The changes made regarding this comment can be found marked up version: lines 211-224, the additional table 2 includes all the uncertainty based on the datasheet. Line 233-239. Table 3 now just presents the X force and Y moment. The Y moment uncertainty has been calculated based on the calibration results. lines 264-270 have been removed which was related to loads in the other axes. Caption in Fig. 6 has been modified. In Fig.6c an additional window presenting Z moment has been added while recognizing the probable high uncertainty. Lines 294-300 have been removed which were related to the other forces. Caption in the Fig. 7 has been modified.



g.sakona@jr3.com
Fri 2021-02-12 8:21 PM
To: Kamran Shirzadeh Ajirlo
Cc: Horia Mihai Hangan; 'Curran Crawford' <currannc@uvic.ca>; pooyanht@gmail.com

Hello All,
Here's some data I was able to come up that will hopefully be of use to you.
During our calibration process we load the sensor along and about each axis individually. We typically load from 0 to + full scale in 5 equal steps, then back down to 0, then to -full scale, then back to zero, giving 21 loading points.
Because of limitations of our calibration rig we didn't load your sensor to full scales. Instead we loaded to :
Fx,y: 1779.3N (400lb)
Fz: 1779.3N (400lb)
Mx,y,z: 293.8Nm (400lb x 6.5in moment arm)

Since the largest load you showed me that you applied was an My load (23Nm) we'll look at the cal data from that axis. Each step of the cal loading is 20% of the max or 400lb * 6.5in *20% * (1Nm/8.85in-lb) =58.7522 Nm so that is the smallest My load applied during Calibration. Counting both positive and negative, it was applied four times.

Here's the output from those 4 loadings. You can see how close to +/-58.7522 the My values are.

Fx	Fy	Fz	Mx	My	Mz
1.264	0.165	5.614	0.231	**58.7761**	0.145
3.021	-1.662	11.404	0.428	**58.8636**	0.190
1.369	-2.055	10.348	0.441	**-58.6320**	0.263
9.455	-2.336	11.043	0.270	**-58.9834**	0.233

This is about the best we can do in terms of offering you data for your particular situation and it's only meant to give you an idea of the results you could expect. We can look at the same type of data for other axes as well, but your loads are so low that they are even farther from what we have to compare on those axes.

I hope this information is clear and gives you some confidence in the sensor's performance.

Best Regards,

George Sakona
Head of Engineering
JR3
MULTI - AXIS LOAD CELL SYSTEMS

Fig. 1: Email from JR3 company with the calibration on the Y moment

- **For completeness the information about the turbine must be included such as, blades airfoil-shape, twisted? Tapered?**

A detailed study on this exact turbine has been performed by (Refan, M. and Hangan, H.: Aerodynamic Performance of a Small Horizontal Axis Wind Turbine, Journal of Solar Energy Engineering, 134(2), doi:10.1115/1.4005751, 2012.) which includes the blade geometry and power curve of the turbine. This has been added to the text. In line 161 in the marked up version.

- **For a smooth correction, please check that the number of the line that is referred agree with the document, it was really difficult to follow the author's answer, probably it was written and then change something which mismatched all the lines.**

Sometimes converting the document to PDF readjusts the lines. This time everything has been double checked in PDF format.

- **Technical issues, in the writing, were not addressed, such as equation-> Eq. figures -> Fig, etc.**

All the fonts and figures and equations captions have been edited. You can find this changes in marked up version : lines 88, 90, 99, 101, 111, 116, 119, Fig.1, 138, 141, 144, 146, Fig. 2, 155, Fig.3, 172, Fig. 4, Fig. 5, 247, 273, 275, Fig.6, 291, Fig. 7, .