Reviewer A

All comments included

Reviewer B

1. Authors might have published or presented previous papers for this research topic. Appropriate cites are asked.

Done

1. In Section 3.2, weight components (loading steps) are unclear in this system, whereas the uncertainty is expressed by the absolute value of 5 x 10-6 kg. Readers cannot know the relative uncertainty due to mass. Could you show the weights set of mass stacks?

Done

1. In Section 3.3, you calculated the influence of air buoyancy. But ambient conditions of temperature (21 degree C. +/- 0.1 degree C.) and air pressure (1003.4 hPa +/- 2 hPa) which you used for the calculation never be realized in every daily calibration. The reviewer think that the ambient conditions used for the uncertainty calculation should involve whole possibilities in daily variation in a year. For example, 21 degree C. +/- 1 degree C. and 1015 hPa +/- 25 hPa would be acceptable.

We have a climate-controlled hall and the option to measure the ambient condition continuous. When we take a single measurement data we also take the ambient conditions data and calculate the measurement budget of the current state. So the uncertainties are possible.

1. In Section 3.5, the name, specification, cut-off frequency and manufacturer of amplifier should be written. If the DMP40 manufactured by HBM was used and 0.22 Hz of Bessel filter was set, the fluctuation of at least five digits for the digital resolution of 0.000001 mV/V in the no-loading condition must appeared. “Two digits” are likely too small. Please put clear explanation of so small fluctuation.

We are using a DMP41 with a low pass filter of 0.04 Hz Butterworth which allows a better stability and we also measured the linear dependency for different additional weights. The result shows a perfect linear dependency which means the fluctuations are low. We have an influence of the long-time stability in the order of 2 digits but we repeated the measurements several times to reduce this influence.

1. In Section 3.5, “3.1 x 10-4 N m” corresponds to 1.6 x 10-7 as a relative value for 2000 N m. Why could you achieve so small resolution? Please explain in the paper.

Reviewer B is correct. It’s my mistake. The maximum load step is 600 N·m. We also split the additional masses for both air-bearings, so we could reduce the range of the influence by factor 2. More details [9]

1. In Section 3.6, it is unclear how to measure the length change due to torsion loading. A figure of metallic bands including dimension of measuring distance should be inserted. Please explain how to measure the length change using the figure. It would definitely be more helpful for readers.

Reviewer B is correct. Because of the long period between submitting this paper and receiving the reviewer comments, I already published a very comprehensive paper about the all details. So I refer to this paper. [9]

1. In Section 4, figures are needed to explain how to measure and how to evaluate geometrical characteristics. It is very tough for readers to understand your evaluation method without figures.

Same as 6

1. In Section 4.1, it is unclear how did the parallelism error (angular error) become to the torque uncertainty. The more explanation should be required with figures and/or equations. Where are the reference point and measurement points?

Same as 6

1. Same question in Section 4.2. The more explanation for deviation in the height orientation should be required with figures and/or equations.

Same as 6

1. Same question in Section 4.3. The more explanation for deviation in the planarity of the pressure plate, adaptation and sensor should be required with figures and/or equations. Where is the pressure plate? What is adaptation? What is sensor? Multi-component force and torque sensor? Or other sensor? Lack of information makes a lot of inquiries from the reviewers as well as from readers.

Same as 6

1. In Section 5, the computation method for the calculation of disturbing components must be explained. It is unclear how could those disturbing values (0 N m +/- 0.4 N m, 3.49 N m +/- 1.01 N m, 0 N +/- 2.6 N and 0 N +/- 0.3 N) be obtained.

Same as 6

1. In Section 6.1, please express the uncertainty of calibration of *F*z, but not only “class 1,” and also calibration range (from 50 kN to 500 kN?). The calibration range for the uncertainty of < 7 x 10-4 for *M*z should also be written in the paper (from 20 N m to 400 N m?). Did you investigate only clockwise torque? It should be explained in the paper.

Done

1. In Section 6.2, the appropriate citation for “the multiple polynomial regression method” must be required if the authors did not invent the method.

It’s general knowledge and only the extension of normal linear regression. Any information can be found in Wikipedia or standard literature of math. Because of this the author can’t see the point for a citation.

1. In Section 7, “1 N FSM” may be wrong. 1 MN FSM may be right.

Done

1. In REFERENCES, [1] was not found in the paper.

See abstract

That is all.