

## ***Interactive comment on “A miniature Portable Emissions Measurement System (PEMS) for real-driving monitoring of motorcycles” by Michal Vojtisek-Lom et al.***

### **Anonymous Referee #4**

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General comments: This paper talks about tests to evaluate a new miniaturized portable measurement system (Mini PEMS) specifically design to be applied in motorcycles. It is shown the principles of measurement, comparison tests from laboratory and some results from road tests. The article is a little bit long but very interesting since it is bringing to light a usually not-so-discussed issue that is the pollution coming from motorcycles, that if in Europe can be not so significant, in another hand in Asia and Latin America the powered-2-wheel fleet is relevant, as well their emission. It is interesting also the concept of a PEMS that can be assembled in a motorcycle. Although a commercial PEMS can do it, the high weight and high cost make the practical utilization impossible. The scientific approach done in the paper is correct but some points

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can be improved: - The general objective is not clear. Is it maybe to validate the Mini PEMS? Or is it just to demonstrate the new technology? - It was a little bit confusing when in the paper it was introduced one Mini PEMS concept; after it was shown a second one, described as “the same technology” but clearly it was a different instrument. Some evaluations are focused on the Mini PEMS #1, others in #2 and some in both.

Specific comments: - Page 4, line 21 to page 5, line 2: this description could be summarized by just saying which method was applied. - Page 6, line 5 to 9: why “real-driving test” doesn’t follow minimally the RDE procedure? It could be done just the urban trip; it would be much more interesting and would be useful to compare with car emissions also. - Page 6, lines 20 to 28: It is not clear what particulate size is being measured here. Is there a way to separate them to measure PM10 or PM2.5? Another point is that the laboratory method measures just non-volatile particles and Mini PEMS is measuring everything, thus the results are not comparable. - Page 7, lines 5 to 8: Pictures referenced here are confused, with many details to see in a small picture and first it is shown the details (Picture S1) and the general assembly after (Picture S2). I suggest splitting these pictures in order to be bigger and placed in sequence. - Page 7, line 26: it is not true that motorcycles engines have smaller rotational speeds than a car, usually they run about two times faster than a four-cylinder car engine. - Page 7, line 27: Equation 2: where is considered the engine displacement? - Page 12, lines 15 to 28 and supplementary Table S5: I’m not sure that it is possible to consider the Mini PEMS has a good agreement to laboratory bench because variations showed here are larger than allowed to a regulatory PEMS. - Page 12, line 20: THC is not a regulated pollutant but all regulations regarding RDE in EU have instructions about THC measurements, so it is important to keep it in sight, even to demonstrate a weakness in the Mini PEMS - Page 12, line 20, Figure 8: this figure shows only results from Mini PEMS #2. What about Mini PEMS #1? Is this paper evaluating the one, two, or both? - Supplementary, Figure S4: It is not clear what is represented in these two graphics. Is it for tests 1 and 2? I suggest identifying them, even because in Table S6 is described three tests.

Technical corrections: - I don't understand why tables and figures are at the end of the paper. If it is an editor requirement, ok; if not, it will be easier to follow the authors' thought if figures and tables are inserted into the text. - Equations 1, 2, 3 and 4: poor resolution; it is missed a space (white line) before and after equation 4 - Page 12, line 31: Text makes reference to Table S8 but I believe that the correct is Table S6 (also for page 14, line 28) - Page 27, Table 6: It would be interesting to show three significant algarisms instead of only two for all pollutants except CO<sub>2</sub>, e.g., HC on the bench, test 1, 0.209 instead of 0.21.

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