SSA 2

PV Diagram

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Goal

- The goal of this SSA is to describe how the experiment on the 22nd of February went.

Conclusion

- All measurements of the engine components have been made.
- We have 4 measurements for each type of load (no load, half load, full load) for the fuel E0 (Aspen).
- We have 3 measurements for each type of load (no load, half load, full load) for the fuel E10.

Problems

- At the beginning we had some small difficulties with the computer which did not want to log in.
- The program used to measure the data was not straightforward to use at the beginning as we had some difficulties with file saving and defining certain parameters. With the help of the tutor we managed to overcome them.

Follow up Steps

- As we have right now plenty of data, it will be actually time to start using making use of it and start doing some plots, determine some measurement errors and when a formula to get the Volume is know make the PV diagram from the different loads.

Work Division

- Measure different engine components and take some picture
- Do the measurements using E0 and E10 and different loads.

Time Division

- Read experimental plan of Thomas and Dolf 0.5 hours
- Measure different engine components 0.5 hours
- Engine measurement experiment 1.5 hours
- Writing SSA: 2 hour

Overleaf Link

1 Measurements of different Engine components

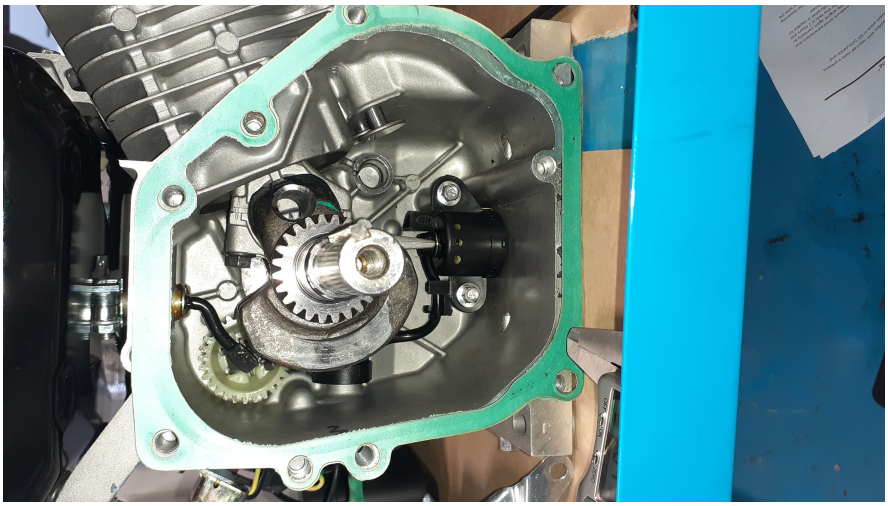

Figure 1: Disassembled Honda Engine

While arriving at the Zero Emission Lab (the place where the experiment took place) an engine was disassembled already for us. We measured the different components using provided tools(ruler, Digital Vernier Caliper, Équerre). For some components for which the accuracy needed was really important we took some pictures (which can be found on the folder Other Documents\Code\Real Experiment Data Lab 2\Pictures Component) in order to measure digitally using image editing software such as Photoshop.

Below, a table with all the measurement data can be found:

Component	Measurement
Crank ass arm radius	34.99 mm
Bare hole	67.01 mm 67.18 mm 67.50 mm 67.51 mm 67.75 mm
Depth	54.84 mm 54.55 mm 55.18 mm 54.34 mm 54.81 mm
Valve bearing	35.39 mm 110 °C

2 Engine load measurements

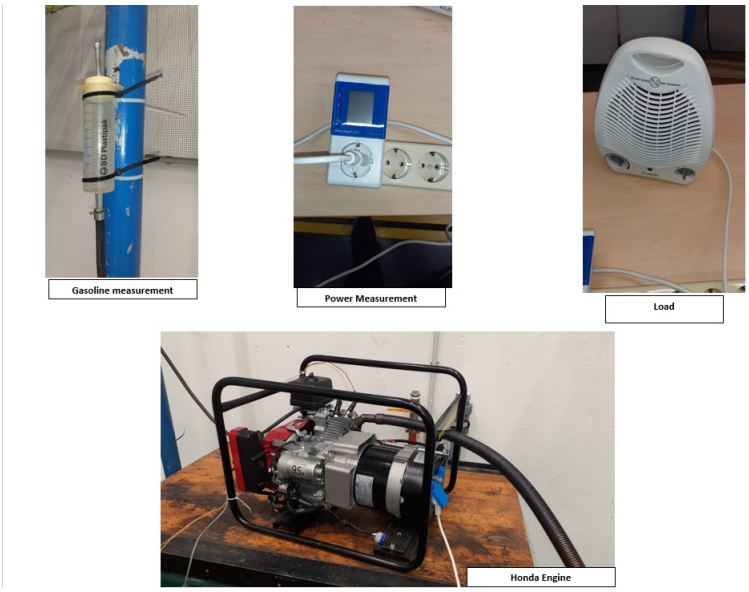

Figure 2: Experiment Setup

At the beginning we had some technical problems. Every time we were running the experiment we could not save the file. Additionally, while we were trying to input the parameters from the Handbook on Canvas we could not implement it in the software. With the help of the Teacher Assistant we managed to make it work but we lost some important minutes.

Due to the limited amount of time available, the experiment was only conducted with 2 types of Gasoline, E0 and E10. In order to get as much data as possible from the experiment, with the Gasoline E10 4 tries were conducted per each load category, leaving a total of 12 files. Each experiment had a time of 1 minute. For the gasoline E10, in order to speed up things a little bit we have decided to cut the time per experiment to 40 seconds and only do 3 tries per load. The data files can be found on Github in the folder Other Documents\Code\Real Experiment Data Lab 2.

Please find below 2 tables corresponding to some parameters observed during each experiment.

Combustible	Load type	Volume Combustible	Max Power (W)
E0	full_load_5	28-1 ml	1663 W
E0	full_load_1	96-71 ml	1661 W
E0	full_load_2	71-49 ml	1656 W
E0	full_load_3	49-24 ml	1655 W
E0	full_load_4	50-28 ml	1660 W
E0	half_load_1	79-59 ml	989 W
E0	half_load_2	59-41 ml	991 W
E0	half_load_3	41-23 ml	995 W
E0	half_load_4	50-40 ml	991 W
E0	no_load_1	100-89 ml	25 W
E0	no_load_2	89-72 ml	26 W
E0	no_load_3	72-59 ml	23 W
E0	no_load_4	59-50 ml	24W

Table 1: Load measurements of the Engine using as fuel Gasoline E0 over the interval of 60 seconds.

Combustible	Load type	Volume Combustible	Max Power (W)
E10	full_load_1	99-83 ml	1675 W
E10	full_load_2	83-67 ml	1680 W
E10	full_load_3	67-51 ml	1677 W
E10	half_load_1	51-39 ml	1000 W
E10	half_load_2	39-28 ml	1000 W
E10	half_load_3	28-14 ml	998 W
E10	no_load_1	100-91 ml	23 W
E10	no_load_2	91-82 ml	23 W
E10	no_load_3	82-72 ml	23 W

Table 2: Load measurements of the Engine using as fuel Gasoline E10 over the interval of 40 seconds.

References