Combustion Engine-4GB10-Interim Presentation

5TH OF MARCH 2021

Team 007: Lars van Alen, Thomas Driessen, Dolf Eck, Vito Fransen, Mats van der Heijden, Joey Janssen, Alexandra Văcaru, Mihai-Dragoș Ungureanu

Department, Sub department or Capacity Group

EINDHOVEN UNIVERSITY OF TECHNOLOGY

Planning of the presentation

I. Introduction

- A gardening company GroenDoen (fictious) decided to opt for a using a greener fuel
- A team of 8 people will focus on analyzing this green fuel and see how it react with the Honda GX200 engine
- Deadline for the project 19^{th} of March.

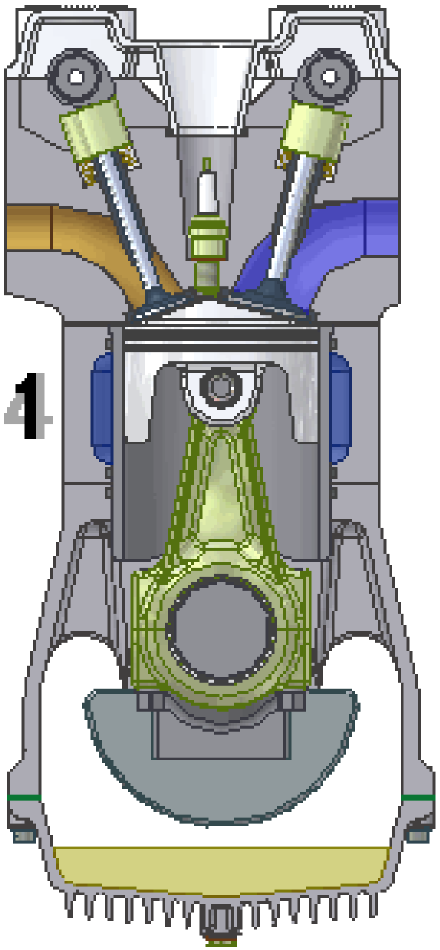
II. Our Initial Approach

- First a planning + Gantt Chart were made
- Secondly each team member did an RPC List (but it was decided to do not use it)
- Thirdly, a collaboration platform was made where planning can be seen and working together on code is possible (Gitkraken)
- Fourthly, team roles were distributed on a weekly basis

III. Research

A. Thermodynamics & Engine Combustion

- combustion engine type used for the project: Otto combustion engine (air-fuel is ignited with a spark)
- The engine operates under the Otto cycle:
  1. The air-fuel mixtures comes in the combustion chamber
  2. The mixture is compressed by the piston
  3. Spark plug ignites the compressed mixture
  4. Ignited mixture is then used as power (piston pushed down)
  5. Left-over exhaust gasses are pushed out of the combustion chamber by the piston



B. Bio-Fuels vs Normal Fuel

Bio-Fuels (Ethanol)

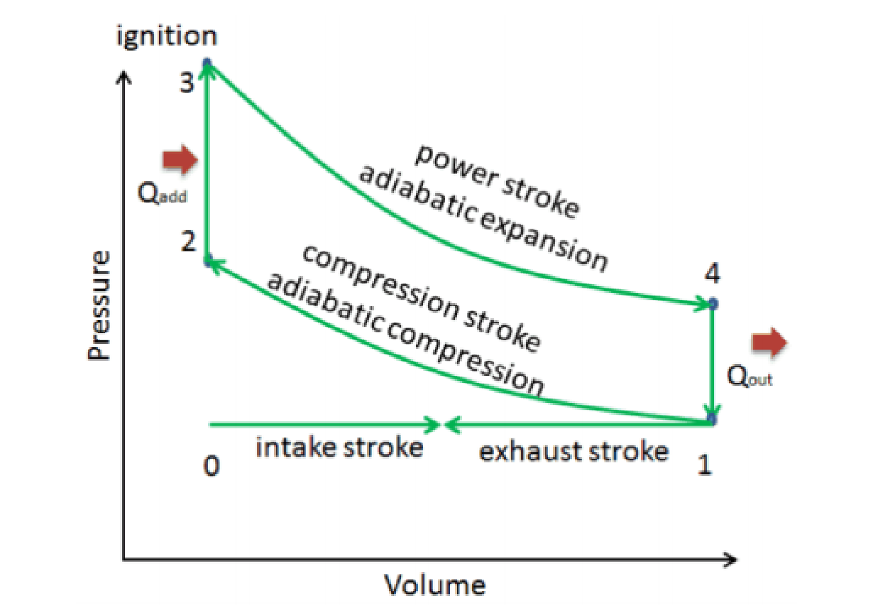
- Bio-ethanol is produced either from corn, sugar plants or starch (fermentation)
- Ethanol is added to the normal fuel
- High octane number thus self ignition is reduced

Normal Fuel (Gasoline)

- Gasoline is manufactured from crude oil (distillation)
- A special compound is added that reduces emissions and increase mileage
- Several additives might be added for increased performances

C. PV Diagram

- Describes the corresponding changes in volume and pressure in the system
- Determine the efficiency of the engine
- Allows to make statements about the internal energy, heat transferred and worked done on a gas



IV. Experiments

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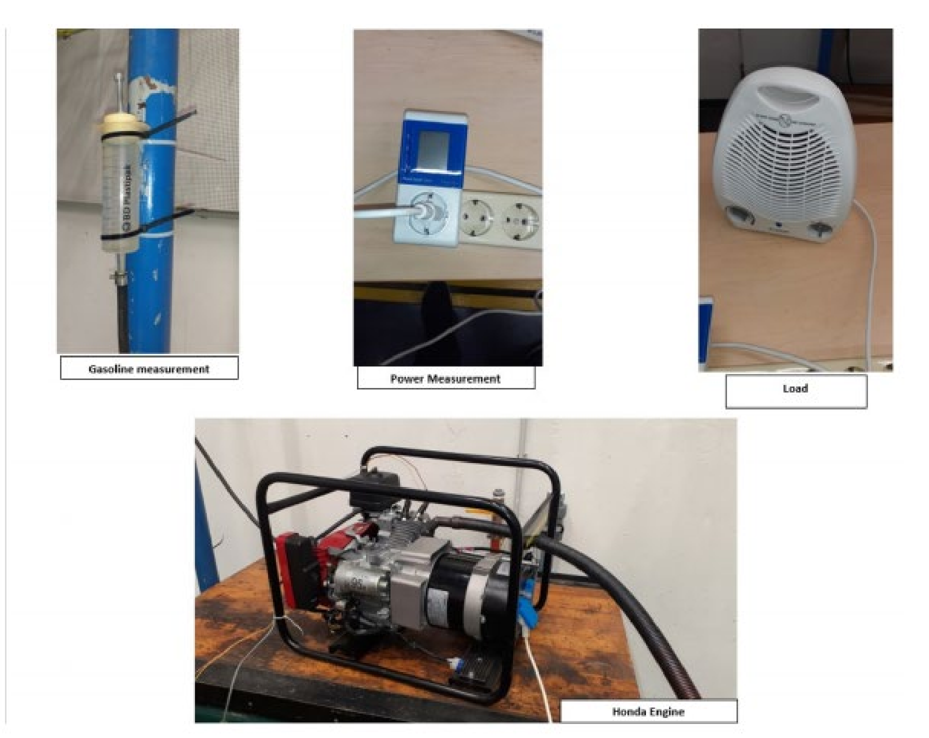
A. Setup

- The setup was composed of a Honda GX200 engine
- The load was a fan connected to the engine and to a power measurement (for power consumption)
- The fuel was transmitted to the engine using the gasoline measurement tube



B. Results

- 2 test were conducted
- 1st test, 2 types of gasoline were used E0 (3 runs each) and E10 (4 runs each) and 3 load scenario were conducted (no load, half-load, full-load)
- 2nd test, 2 types of gasoline were used E5 and E15 using the same load scenario, 5 times each

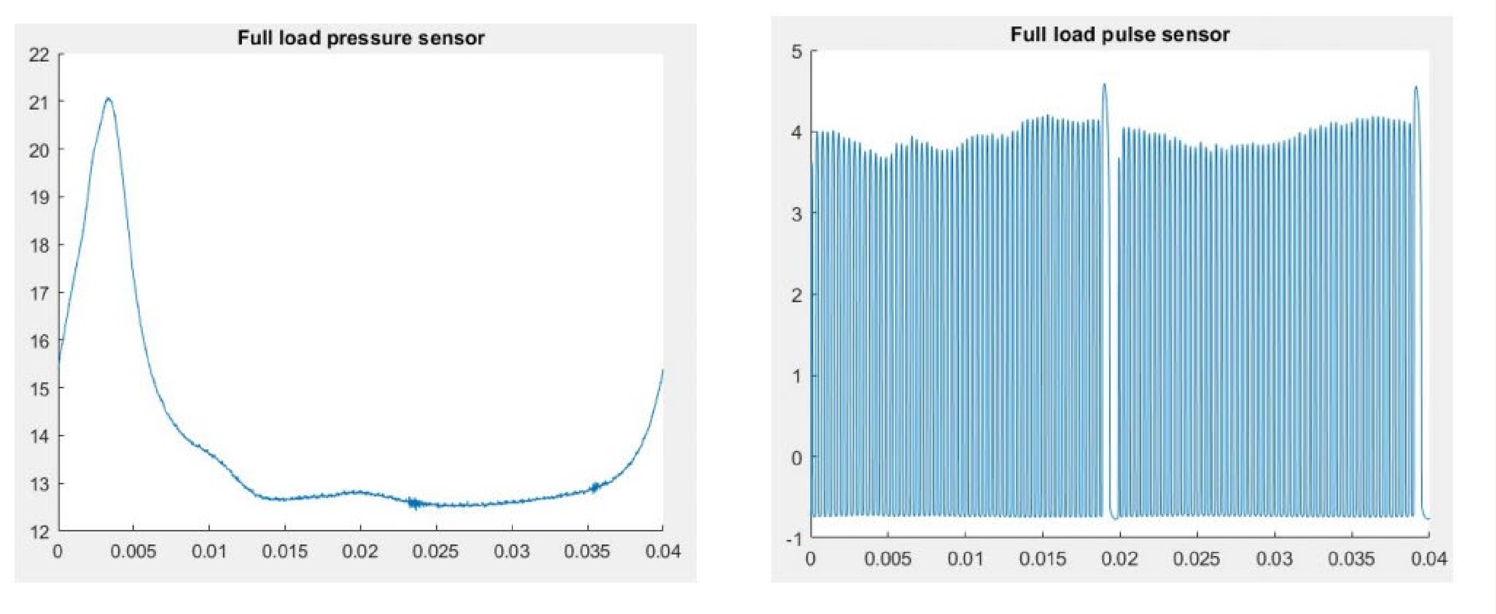
Combusti
E0
E0
E0
E0
E0
E0
E0
E0
E0
E0
E0
E0
E0

Combustible	Load type	Volume Combustible	Max Power (V
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

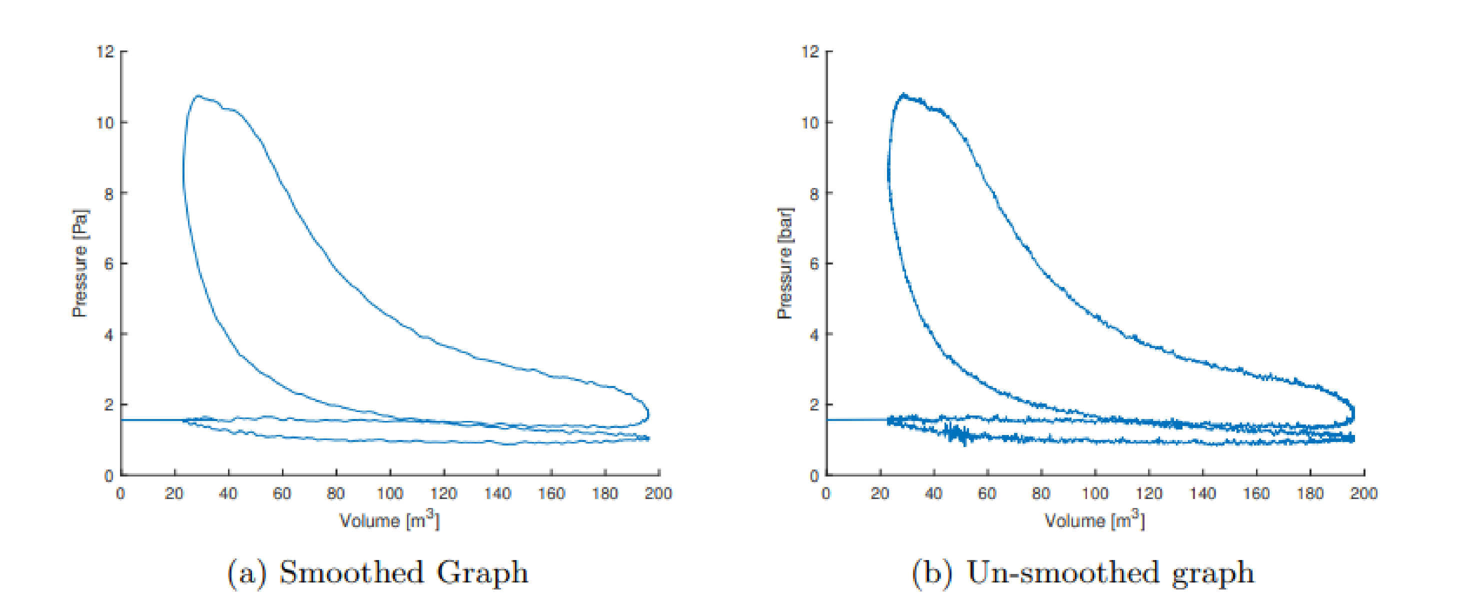
C. Current Analysis

- PV diagrams can be computed from the measured data
- The double tooth can be determined from the pulse and pressure graphs
- Fuel efficiency can now be calculated

Pulse and Pressure Graphs (full load)



PV Diagram (half load)



V. Future plans

Future implementations

- Compare all the datasets that we have of the different type of fuels and see which one performs the best
- Improve the PV diagram in order to be as precise as possible to the theoretical model
- Make an analysis and complete the report

V. Any Questions?