SSA 3

Inlet & outlet state and converting pulse sensor data

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Goal

- The goal of this SSA is to plot the inlet and outlet stated of the ideal P-V diagram. Because this SSA was quite short, I did more research into the way to convert the data from the pulse sensor into the crankshaft angle.

Conclusion

- The P-V ideal diagram is completely done

Problems

- I could not figure it out how to determine the initial position of the double tooth of the pulse angle from the pressure-time and pulse-time graphs

Follow up Steps

- Find ways to convert the data from pulse sensor to crankshaft angles by finding a way to determine the position of the double tooth

Work Division

- The bigger SSA of finishing and fixing the issues in the model made by Dolf and Thomas was assigned to me, Vito and Lars. We talked and agreed that I will be working on writing the code for the inlet and outlet state of the P-V diagram.

Time Division

- Meeting with Joey to explain more about the pulse sensor problem: 20 minutes
- Working on the intake and exhaust state for the P-V diagram: 45 minutes
- Making the SSA: 30 minutes
- Researching how we can determine the position of the double tooth: 2 hours

Overleaf Link

1 Inlet and outlet states

This case is an ideal one and therefore it was quite straight forward that from the state 0 to 1 the pressure is constant and equal to the ambient pressure. Another assumption was the fact that the volume in the 0 (5 in the figure below) position is the max volume, which is represented in positions 2 and 3. The inlet and outlet states are the same.

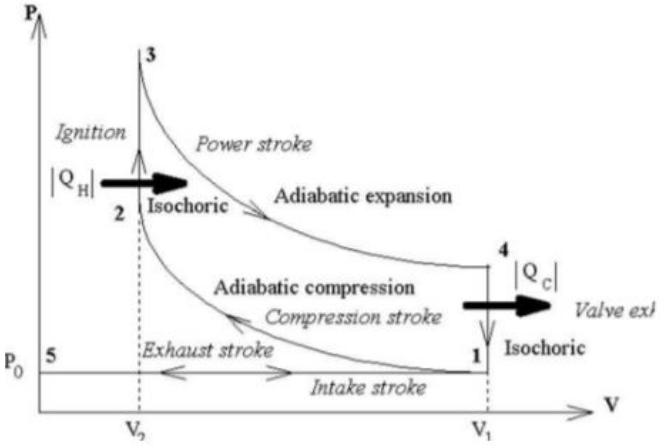


Figure 1: P-V ideal diagram

It took my a bit to figure it out how to actual plot the state in the diagram, but here is the code:

```
P12(1)= P1;
V12(1) = V2;
steps =  1000;
for i=2:steps+1
    P12(i) = P1;
    V12(i) = V1;
end
```

Figure 2: Code for the inlet state

Here is the final P-V diagram:

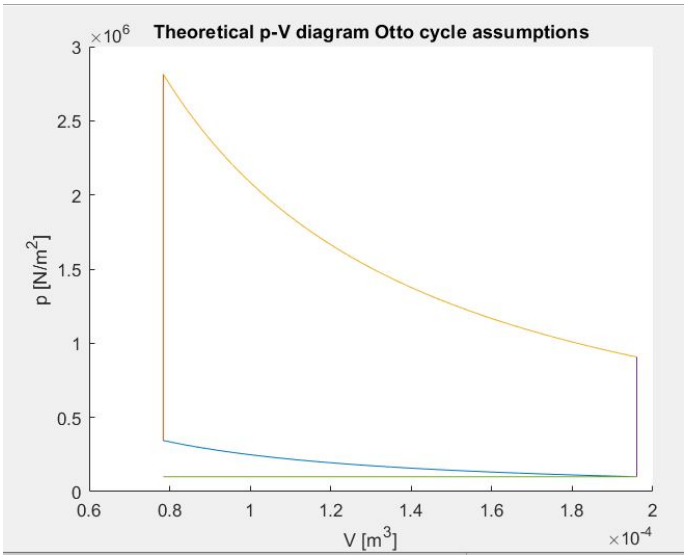


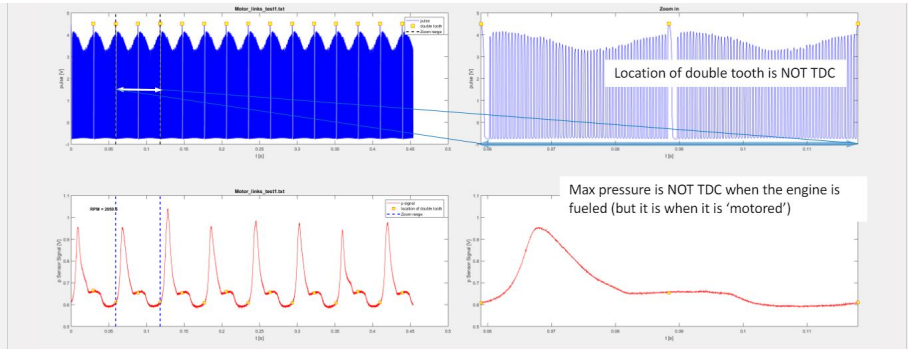
Figure 3: Final P-V diagram

2 Research on finding the position of double tooth

The research began by looking throw the discussions on discussion page on Canvas. The information that was would is summarized here:

- From the example data you cannot determine which position of the pulse sensor corresponds to the TDC. So you have to take a value that seems reasonable.
- TDC will not be there where p is maximal.
- Motoring is when the engine has no combustion for instance when you switch of the engine and he is slowly coming to a stop.
- Fueled: means it is running on fuel and spark is engaged

On Canvas there is the document which gives more information on the pulse sensor.[1] It gives the graphs of pulses wrt time and pressure wrt time, which should be used to find the position of double tooth. On the graph we can see the yellow square which is an indicator of the double tooth.



Sadly, I could not make a valid correlation or a solution on how to determine the position of double tooth from the two graphs above.

References

[1] https://canvas.tue.nl/courses/14094/files/3005738?module_item_id=256208