SSA 1

Subject: 4GB0 Combustion Engine

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February 8, 2021

Goal:

- Producing a prospective timeline for the project in a PDF/Excel Format

- *Produce a Overleaf Report File*

Conclusion:

- A prospective timeline has been created which outlines goals, and activities to achieve them. Including all the deadlines for the assignments coming up. Meeting most POV requirements (see problems for missing once).

- The planning is made such that the first few weeks seem intense as a lot of things need to be done before the experiment, and the second half of the project is a lot less busy this is to allow for extensions on certain areas, such that the planning can be adjusted along the way.

Problems:

- The POV support documents suggest assign people tasks already (my interpretation) which seems a little tricky and hard to do not knowing the strengths and weaknesses of each team member

Follow up Steps:

- The group has to review the planning and the neccessary adjustments where needed need to be implemented.

- Discuss problems outlined.

Work Division:

- I worked together with Mats on the Planning. I focused on getting all the deadlines, and all the information, and putting that in a Gantt chart. Mats worked on some of the smaller things like creating a role division scheme, and copying down the rules and agreements from the white board.

Time Division: 4 hours

- Spent 1.5 hours going through the Manuel carefully reading all the things and summarizing the important aspects.

- Spent 1.5 hour organizing and creating the planning in a Gantt Chart

- Spent 0.5 hours creating a list of RPC - or things to do.

- Spent another 0.5 hour setting up an overleaf document for the final report.

Link to SSA Click Here

1 Planning and Gannt Chart

In order to make the planning I want through the Canvas Page, project manual, and project handbook, and made notes. (I included these notes in this file as they also contain useful information on the smaller things which have to be done for specific things.) Based of that I made a list of all the things we have to do and spread that out over the 7 remaining weeks, and grouped them into 4 main categories; planning and research, experimenting and data analysis, modeling, and report writing/presentations.

I tried using the smart criteria whilst assigning time frames. The only aspect i struggled with completing is assigning workloads to individuals. It seems from the documents that this is necessary to do so in the planning, but to me it makes more sense to that each meeting. The link to gantt chart is provided in: Group 7/other documents/Links/Gantt chart. (scroll up, to the top, and use the slider in the sheet (not the one on the bottom of excel) to move across the weeks and look at the planning) An image of the first few weeks is included in this file.

Gannt Chart - Click Here
(https://tuenl-my.sharepoint.com/:x:/g/personal/$d_{je}ck_student_tue_nl$/EWlHlsXvS6FAkcEt7nQTGFEBLPmz4bWh S2TvZC)

2 RPC list

I do not think an RPC list quite an appropriate tool for tackling this project, because we are not designing a product, and to a large extent the experiment is already outlined. Nevertheless there are things which we have to do this in this project - requirements, and things which we could do (preferences)

Requirements:

1. deadlines - see planning
2. Answer the question - What is the efficiency of an engine when it is running on gasoline or gasoline/ethanol blends?
3. Answer the question - How can efficiency be improved with minimal changes?
4. Do at least one experiment with the Gen set to obtain data
5. Get the measurements of the engine for the model
6. Produce a MATLAB script to describe the thermodynamic process.
7. determine the efficiency
8. Provide an advice to the company
9. Write a technical Report

Preferences:

1. Make "app" where the user can predict efficiency, consumption, *costs*, based on the petrol to ethanol ratio. Using the MATLAB script.

3 *Report file Overleaf*

Since I had some time to spare and my task was not so time consuming, I decided I could already set up the overleaf report. The link can be found on the canvas page in Links folder. Furthermore I have started outlining some of the chapters in the report.

The current outline looks as followed:

Contents

Figure 1: Caption

4 Notes

Main question to answer:
What is the efficiency of an engine when it is running on gasoline or gasoline/ethanol blends?
How can efficiency be improved with minimal changes?

Experiment 1:
2 hours to investigate the engine in detail and to measure the required information (see canvas for timeslots), Key quantities:

1. bore

2. Stroke

3. Length of the connecting rod

4. dead volume and compression ratio

5. valve timing

6. time of ignition

Video of disassembled engine is provided due to covid. The measurements will need to be taken during experiment on 2 when there is a disassembled motor available.

Experiment 2:
Constant revolutions (3000 RPM), induced frequency = 50Hz Engines have pressure sensor and crankshaft encoder (angle of crank) Plot Pressure v crank angle –¿ indicator diagram Carburettor is going to react to this change in ethanol concentration differently. 2 hr session Take the

measurements of experiment 1

Experiment 3
Optional extra measurement series (2hrs) after GO/NO pitch (if necessary)

Interim presentation:
Present the progress made thus far with measurements and modelling work. Discuss relevant issues solved. Include planning on what is next. Contractors are technically schooled. Deadline: Friday 5 March 2021 14.40-15.55 Teams - L.M.T. Sommers

Analysis of Measurement Data:
Reports on this will count to 103 weeks video lectures, 2 hours per week Week 2, 3, 5 3 weeks self study on recommended exercises 2 hours per week. Question asked through Canvas page. Deadline: Friday 19 March 18.00 hrs

Professional skills - writing skills 2:
The final report will be assessed using the writing rubric, al group members receive the same grade.

Professional skills - planning and organizing2:
Hand in mutual project planning Needs to be maintained and updated through out the project Deadline: Monday 15 February 2021 at 10.00 AM

Planning:

1.
2. Make planning for coming 8 weeks
3. Trello
4. PDF/Excel
5. Set-up git hub file sharing system
6. Investigate Experimental procedure
7. Investigate thermodynamics involved
8. Investigate fuels
9. Look at the provide MATLAB code
10. Obtain measurements for model (Experiment 1) to use in model
11. Start modelling the thermodynamic processes (MATLAB)
12. Determine method of computing cylinder volume over time
13. Determine method of accounting for sensor drift during the measurement
14. Start experiment 2 plan (i.e. what has to be measured and done during the session)
15. Select two team members to do experiment 2
16. Reserve time slot for the allocated time (two team members)
17. Start Report during the break: introduction, background theory, including thermodynamic principles and fuels.
18. Work on training analysis of measurement data - Canvas
19. Do experiment 2 ($\neg$get data for experiment 1)
20. Start processing data from experiment
21. Finnish first model of thermodynamic process
22. Start report sections: Describing the mathematical model i.e.

23. Start Presentation Go/No Pitch

24. Elect presenter(s)

25. Work on training analysis of measurement data - Canvas

26. Process results (Exploratory Data Analysis)

27. Report sections to be started: Experiment plan, Experiment results.

28. Evaluate the success of the first MATLAB Model

29. Determine possible improvements in model.

30. Midterm peerreview

31. Discuss feedback from Go/No Pitch

32. Extra data collection if necessary

33. Improve MATLAB model by adding more losses

34. Work on training analysis of measurement data – Canvas

35. Start measurement training analysis report

36. Finnish MATLAB model improvements

37. Determine Efficiencies of engine with different fuels

38. Determine how to improve the engine/operation

39. Check previous chapters of the report for content.

40. Provide a conclusion to the company.

41. Finnish Report

42. Check report for coherency, spelling, and grammar

43. Check the writing rubric

44. Final Peer review

5   Gantt Chart first few weeks

4GB10 Combustion Engine

Group 7

Project Start:	Mon, 1/2/2021		
Today:	Fri, 2/4/2021		
Display Week:	1		

TASK	ASSIGNED TO	PROGRESS	START	END
Research & Planning				
Planning: Develop a prospective timeline		100%	5/2/21	9/2/21
Research: Thermodynamics involved with combustion engine		0%	5/2/21	12/2/21
Research: Fuels and impact		0%	5/2/21	12/2/21
Planning: Sign up for experiment date		0%	9/2/21	12/2/21
Research: Method of Computing cylinder volume over time		0%	9/2/21	17/2/21
Research: Method to account for sensor drift during measuring		0%	9/2/21	17/2/21
Planning: Write experiment plan		0%	12/2/21	21/2/21
Planning: Set-up report file in overleaf		0%	9/2/21	12/2/21
Planning Evaluate planning		0%	9/2/21	9/2/21
Planning Evaluate planning		0%	26/2/21	26/2/21
Planning Evaluate planning		0%	9/3/21	9/3/21
Planning Evaluate planning		0%	23/3/21	23/3/21
Modelling				
Develop a mathematical-physical model		0%	5/2/21	12/2/21
Translate mathematical-physical model to MATLAB		0%	9/2/21	26/2/21
Improve MATLAB model		0%	5/3/21	16/3/21
Clean MATLAB model (i.e. Remove clutter)		0%	16/3/21	19/3/21
Experimenting & Date analysis				
Training Analysis of Measurement		0%	9/2/21	9/2/21
Training Analysis of Measurement		0%	12/2/21	12/2/21
Training Analysis of Measurement		0%	23/2/21	23/2/21
Training Analysis of Measurement		0%	26/2/21	26/2/21
Training Analysis of Measurement		0%	9/3/21	9/3/21
Training Analysis of Measurement		0%	12/3/21	12/3/21
Experiment 2 (Doing the actual experiment)		0%	22/2/21	26/3/21
Evaluate data from experiment 2		0%	26/2/21	3/3/21
Determine Improvements/short comings for model		0%	5/3/21	9/3/21
Determine Efficiencies final		0%	16/3/21	19/3/21
Report Writing & Presentations				
Prepare slides for presentation		0%	26/2/21	4/3/21
Write Measurement Training report		0%	12/3/21	18/3/21
Elect presentor for presentation		0%	2/3/21	2/3/21
Report section: Introduction		0%	9/3/21	12/3/21
Report section: Background information (Research etc.)		0%	12/2/21	23/2/21
Report section: Mathematical-physical Model		0%	12/2/21	23/2/21
Report section: Translating MATLAB model (Techniques)		0%	12/2/21	23/2/21
Report section: Write experiment plan section (Appendix?)		0%	26/2/21	2/3/21

TASK	ASSIGNED TO	PROGRESS	START	END
Report section: Experiment 2		0%	2/3/21	5/3/21
Report section Evaluation of data analysis & Improvements		0%	5/3/21	9/3/21
Report section: Conclusion/advice		0%	19/3/21	26/3/21
Report: Check grammar, vocab, coherency		0%	23/3/21	30/3/21
Report: Check Writing rubric (POV - Writing skills -2)		0%	26/3/21	30/3/21
Deliverables Due dates				
POV: project planning		0%	15/2/21	15/2/21
Midterm Presentation		0%	5/3/21	5/3/21
Meaurment tes		0%	31/3/21	31/3/21
Analysis of Measurement Data		0%	19/3/21	19/3/21
Final Report		0%	31/3/21	31/3/21
Insert new rows ABOVE this one				

Calendar header: 1 Feb, 2021 | 8 Feb, 2021 | 15 Feb, 2021 | 22 Feb, 2021

Days: 1 2 3 4 5 6 7 | 8 9 10 11 12 13 14 | 15 16 17 18 19 20 21 | 22 23 24 25 26 27 28

(POV: project planning marked on 15 Feb, 2021)

References

[1]

[2]

[3]