

Coursework Assignment 2: Planning experiments (25%)

In an investigation of a new gasoline plug-in hybrid-electric powertrain there are several new systems to be proven and understood and finally calibrated.

For the new powertrain considered in this study the combustion system is naturally aspirated DI spark ignition. The 1.6l engine is equipped with VVA on both inlet and exhaust and is paired with a 49kW electric motor. The battery system for the electric machine is 9.8kWh lithium ion.

Submission Requirements

Write a short report, no longer than three pages in length (excluding appendices), describing and explaining an experimental strategy that includes investigation of:

- Management of valve timing.
- Vehicle launch strategy using electric and hybrid power combined.
- SOC strategy for typical driving

Start the report with a description of the overall control strategy. Using diagrams show the actuators and sensors and as you explain the experimental strategy, identify factors (usually controls or calibratable parameters) and response variables (usually quantities that we want to minimise).

Pay particular attention to the overall structure of the experimental approach. Do you need global and local models for example? What do you know in advance that will guide the choice of strategy? You may start with a space filling design and move into classical designs to develop response surfaces. What response surfaces do you need? What is the place of optimal methods if these are used?

You should address the report to a team leader whose job it is to scope the experimental programme.

Assessment

The report will be marked according to the following scheme with marks split between Technical, Report / Writing Style and Presentation. Some guidance is provided below as to how the marks will be allocated.

TECHNICAL (65%)

The facts stated are correct and relevant. Correct statements are made about the technology and methodology proposed. The experimental strategy presented considers the points outlined above.

The proposed strategy draws on evidence presented within the report and by way of reference to other sources of information that are appropriately cited. A minimum of

five external sources of information (excluding course notes/slides) are included. The sources are used in a meaningful way in the report i.e. to support the decisions made and/or provide a background/further information on the topics discussed.

REPORT / WRITING STYLE (20%)

The style of the report and writing is appropriate for a technical document (see the guidance provided by this document on [Report Writing](#) for further information). The way in which it is written is convincing and includes the necessary information providing a convincing argument for the strategy proposed as would be judged by a person reasonably familiar with the topic.

PRESENTATION (15%)

The structure of the report is well considered and includes the necessary headings and sections. Graphics that are included are laid out well. The font style, space and sizing is appropriate. Presentation overall is appropriate. Figures are appropriately labelled. Plots include a title and axis labels as well as units (where appropriate). The report is an appropriate length (no more than 10% longer than the page limit).