

## LEVEL 5 ASSESSMENT SPECIFICATION

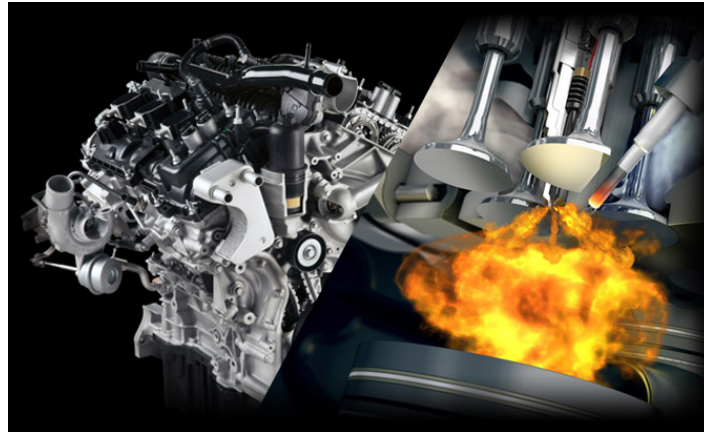
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|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|-----------|
| <b>Student name:</b>                   | -----                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>Student ID number:</b>                                       | -----     |
| <b>Programme:</b>                      | Automotive, Motorcycle and Motorsport Engineering                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                 |           |
| <b>Module:</b>                         | Powertrain and Control                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                 |           |
| <b>Module code:</b>                    | M5X00404                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <b>Contribution to Overall Module Assessment (%):</b>           | 50%       |
| <b>Lecturer:</b>                       | Owen Williams                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <b>Internal Verifier:</b>                                       | Tim Tudor |
| <b>Assignment Title:</b>               | Engine Cycle Simulation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <b>Word count (or equivalent):</b>                              | 2500      |
| <b>Submission deadline:</b>            | 20/1/19                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <b>Return date of provisional marks &amp; written feedback:</b> | 17/2/19   |
| <b>Submission method:</b>              | <p>All written assessments, where practical and possible, must be submitted via Turnitin unless otherwise instructed by the Lecturer. (Please DO NOT put this assessment specification into Turnitin or it will match many similarities with other students' submissions.)</p> <p><b>Alternative submission method (if applicable): NA</b></p> <p><b>Late submission of the assessment will result in a late penalty mark.</b> Penalties for late submission: Up to one week late, maximum mark of 40%. Over one week late, 0%. Only the Extenuating Circumstances Panel may approve a change to submission dates.</p> |                                                                 |           |
| <b>Academic honesty / referencing:</b> | <p>Academic honesty is required. In the main body of your submission you must give credit to authors on whose research and ideas your work is based. Append to your submission a reference list that indicates the books, articles, etc. that you have used, cited or quoted in order to complete this assessment.</p>                                                                                                                                                                                                                                                                                                 |                                                                 |           |

### Module Learning Outcomes (from module syllabus)

1. demonstrate in-depth knowledge and understanding of accurate engine measurement techniques and cognitive skills in the characterisation of a modern engine (component A)
2. apply appropriate theoretical and practical methods in the analysis of the airflow and combustion characteristics of project engine to specify modifications to cylinder head, camshaft and compression ratio to improve engine operation to meet drive-cycle requirements of fuel economy and emissions coupled with good power and torque characteristics (component B)

## TASK DESCRIPTION

Using the skills that you have been developing in the classes, you are required to analyse a real engine's performance characteristics and to create a simulation model that is able to predict the thermodynamic characteristics of an engine cycle. Using real data which you will be provided, you will need to develop a validated simulation model and test this model to assess its feasibility and limitations.



### Assignment Tasks:

1. You will be provided with cylinder pressure data from a suitable test engine and use this data to determine the in-cylinder parameters and characteristics of the engine. You will need to determine how the pressure changes with crank angle and hence piston position, the polytropic index of the compression and expansion processes, the degree of heat transfer occurring, the temperatures of the gas, the work done by, or to the system at different stages of the cycle and how this information is related to the performance characteristics of the engine. (50% of the assignment)
2. From first principles, you need to develop a thermodynamic engine simulation model using the geometry of the real engine, your understanding of the physics involved, including the thermodynamic and combustion processes and using the real engine performance parameters that you determined from your analysis in task 1. Once you have a fully functioning model, you need to show that it can produce all of the results/graphs that you determined from task one. You need to validate your model against the real data as best you can, highlighting any discrepancies or limitations that you may find. (50% of the assignment)