ENGINE TEST EVALUATION AND HRR ANALYSIS
RULES AND REQUIREMENTS FOR THE SUBMISSIOON OF THE WRITTEN REPORT

The submission of the reports is compulsory for the exam.

The evaluation of the written report will be part of the final score of the exam.
The report can be submitted by single students or by groups of students (max 3 students per group allowed. Clearly indicate your name(s), surname(s) and student number(s) in the cover page of your report.

Deadlines (read this carefully!):

Submit the report by uploading it on the dedicated section (Elaborati) of the course page on your personal profile on Portale della Didattica. Use the format studentnumber _name_surname_ENGINETEST for the second report. The deadline is intended within midnight of the indicated date.

1 If you intend to sit the first or second call of the exam (June/July 2019), you have to submit the first and second report within MAY 5th

2 If you intend to have the exam in September 2019 or January/February 2020, you have to submit both the reports within 2 WEEKS BEFORE THE EXAM CALL

3 If you will postpone the exam to the next academic year (i.e., if you intend to sit it in June/July 2020 or later) and you will not submit the reports within this academic year, you will need to meet the deadlines that will be given in the year of submission

4 If you attended the course in previous years and you didn't submit the reports yet, you have to meet the deadlines given in the year of submission (i.e., if you want to have the exam during this academic year, you have to respect the deadlines at point 1 and 2)

Meeting these deadlines is compulsory to sit the exam! A penalty will be considered for late submissions.

The reports can be submitted only one time! Once you submitted it, you cannot submit it again trying to improve your mark. This also applies to the students who re-attend the course.

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Data and procedure:

The input data for calculation will be acquired during the students visit at the engine test bed laboratory, therefore there will be a different set of data for each group. Data will be provided when all the groups will have done the laboratory. The data sheet will contain:

- main variables measured during a set of steady state tests performed during the laboratory.
- a measured in-cylinder pressure cycle for one of the steady-state tests performed

The procedure you are expected to apply is the one shown during class lectures:

- steady state tests: calculate the corrected power and torque according to ISO1585. Calculate the fuel conversion efficiency, the bsfc and the volumetric efficiency taking into account of the corrected quantities and of the specific characteristics of the engine (CI turbocharged with EGR)
- In-cylinder pressure cycle: perform the HRR analysis basing on the single-zone model. Consider the proper reference pressure to calculate the absolute in-cylinder pressure. Calculate the polytropic coefficient k as a function of temperature, where in-cylinder temperature is calculated applying the ideal gas state law to the mass of air and EGR (neglect fuel) inside the cylinder. For the calculation of the mass fraction burned neglect the mass flowing in and out of the control volume as well as the heat losses.

Requirements:

The written report should comprise:

1. **Steady-state tests: numerical results for corrected power and torque, fuel conversion efficiency, bsfc and volumetric efficiency; graphical charts of fuel conversion efficiency, bsfc and volumetric efficiency as a function of the corrected torque**

2. **In-cylinder pressure cycle: numerical results for Start-of-Injection, Start-of-Combustion, ignition delay (angular interval), MFB50 (crank angle which corresponds to x_b=0.5); graphical chart(s) representing the measured in-cylinder pressure and the in-cyl pressure in case of absence of the combustion event, the mass fraction burned as a function of the crank angle (possibly indicate on the chart the found values of SOI, SOC and MFB50). Optionally: evaluate MFB10 and MFB90.**

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