FLYWHEEL DIMENSIONING

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_FLYWHEEL for the first 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 are provided in the relative section of the portal and contain:

- a set of data that are common for all the students (first sheet of the attached excel file)
- a set of data that are specific for each student (second sheet of the attached excel file). Remember to indicate these specific data on your report.

The procedure you are expected to apply is the one shown during class lectures. It consists in the calculation of:

- the thermodynamic state of the closed system composed by air, fuel and residuals in the key-points of the ideal air-fuel cycle
- the inertia pressure and effective pressure acting on the piston head and of the related forces acting on the piston head and on the connecting rod
- the shaft momentum and resistant momentum acting on the crankshaft in case of a single-cylinder engine
- the dynamic irregularity and the diameter of the designed flywheel, given a target kinematic irregularity, in case of a single-cylinder engine
- the instantaneous velocity of the crankshaft in case of a single-cylinder engine
- the total shaft momentum and resistant momentum acting on the crankshaft in a multi-cylinder engine, considering an evenly spaced phase shift
- the dynamic irregularity and the diameter of the designed flywheel, given a target kinematic irregularity, for the multi-cylinder engine

Requirements:

The written report should comprise (**the followings also have to be produced for the multi-cylinder engine**):

1. numerical results for pressure and temperature of points 1 to 4, lower heating value at temperature T_2, dynamic irregularity and flywheel diameter for the single-cylinder as well as for the multi-cylinder engine;

2. required charts (both for the single-cylinder engine and for the multi-cylinder engine):

- **in-cylinder pressure VS swept volume (indicated cycle on p-V chart)**
- **effective pressure as a function of the crank angle $p_{eff}(\vartheta)$**
- **indicated cycle with inertia pressure (properly over-imposed)**
- **tangential tension as a function of the crank angle $t(\vartheta)$**

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- **shaft tension $t(\vartheta)$ and resistant tension $t_r(\vartheta)$, shaft work (L_s/V) and resistant work (L_r/V) as a function of crank angle (all in one graph)**
- **instantaneous velocity**

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