

EN2930 Powertrain Design

Professor: Axel Coussement

Language of instruction: French – **Number of hours:** 36 – **ECTS:** 3

Prerequisites: None

Period: S8 Elective 13, One-week module 15-19 May IN28IS1, SEP8IS1

Course Objectives

The objective is to give the students the basic working principle, economical and industrial constraints linked to the piston engines, along with the organisation of the automotive industry : Why so few manufacturers ? Why does gasoline engine are less efficient then diesels ? How do you deal why pollutants ? Which materials are used and why ? ...

To apply the concepts shown in class it is propose to the student to play the role of a design team: starting with a car brief, they will have to perform the market study, define their product (i.e. car/powertrain) and pre-design it. Moreover, they will have work all together to fit within the mean CO₂ emissions limits.

On completion of the course, students should be able to

On completion of the course, students should be able to understand the principles of piston engines and the dynamics of vehicles, the constraints of powertrain design. They should also be able to formulate and understand vehicle specifications.

Course Contents

During the last decades, car engines have been subject to a deep evolution. Since the 90s electronic is more and more used for engine management and new architectures are appearing (hybrid, down-sizing, ...) increasing further their complexity. Those engine's design is thus very challenging and appeal to many different engineering specialities: mechanics, electronics, combustion, chemistry, electricity, material science, production management, etc.

After a general introduction to piston engines focusing on their working principle but also on the economical and industrial constraints of the automotive industry, it will be proposed to :

- ✧ To perform the pre-design of a powertrain: starting with a car brief, they will have to perform the market study, define their product (i.e. car/powertrain) and pre-design it.

Those studies are based on real scenarios encountered in the industry and will emphasize how complex system are designed.

Course Organization

The course is divided into two parts : first a oral course and two mini-projects illustrating it. The time repartion is aproximatively 50%/50%.

Teaching Material and Textbooks

PDF of the slides used in the course.

Evaluation

The evaluation is based a written examan (with course notes) along with the evaluation of the mini-project performed during the course.