Training - Hydrogen Combustion Engine

H2COMB-EN-P | Face-to-face only | 3 days

The aim of this training course is to improve participants to the basics of operating a hydrogen combustion engine

Level
Skilled

Public
Engineers and technicians wishing to understand the basic physics of a hydrogen combustion engine and the major issues involved.

Objectives
Attendees will be able to implement the following skills:

- Understand the general context of the hydrogen economy and hydrogen as a mobility fuel
- Explain the chemical characteristics of hydrogen that influence the mixing process, ignition and combustion
- Understand the impact of hydrogen chemistry on engine performance (efficiency, pollutants, power, torque and noise)

Pedagogical & technical resources

- LMS
- Quiz

Assessment of achievements

- Trainees are assessed throughout the training through practical application phases and interactions with the trainer
- A final on-the-spot evaluation may also be carried out at the end of the course and/or at the end of each module using tests designed to verify the learners' understanding and assimilation of the knowledge linked to the training objectives

Prerequisites
No prerequisites are necessary to follow this course

Responsable
IFP Training instructors, with expertise in the field and trained in modern teaching methods adapted to the specific needs of learners from the professional world

Program

ASYNCHRONOUS PROGRAM TO BE TAKEN BEFORE THE SYNCHRONOUS/CLASSROOM COURSE

INTRODUCTION TO HYDROGEN & HYDROGEN IN THE CONTEXT OF MOBILITY

Hydrogen tomorrow.
Hydrogen production.

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Hydrogen mobility context.
E-fuels.

SYNCHRONOUS/PRESENTIAL PROGRAM

HYDROGEN IN THE INDUSTRIAL AND ENERGY LANDSCAPE — 0.5 day

Hydrogen as an energy carrier: trends, challenges and potential.
Hydrogen and energy networks: gas networks, multivector networks, network flexibility.
Hydrogen as an energy storage medium.
Hydrogen and e-fuels.
Positioning hydrogen in relation to other energy carriers.
Prospects for hydrogen in the energy and economic world 2025-2040.

HYDROGEN PRODUCTION — 0.5 day

The “rainbow” of hydrogen (green, gray, blue, turquoise, yellow): classification, costs, orders of magnitude, advantages and limitations.
Overview of production methods: water electrolysis, hydrocarbon reforming, photosynthesis. Opportunities and prospects.
Limits of different processes and technological prospects.
Case study:

- Calculate the carbon intensity of different H2 production methods in [kg CO2 eq /kg H2 produced].
- Based on average vehicle efficiency, calculate consumption in [kg H2/100 km].
- Calculate the CO2 impact of an FCEV and an HEV (with an ICE H2) in [g CO2 eq /km] according to the means of H2 production.
- Conclude on the advantages and difficulties of the 2 technologies.

H2 COMBUSTION ENGINE — 1 day

Chemical characteristics of hydrogen that influence the mixing process, ignition and combustion.
Impact of hydrogen chemistry on engine performance (efficiency, pollutants, power, torque and noise).
Engine technologies and technological developments required for hydrogen combustion (injection, intake, combustion, aftertreatment).
Advantages and m disadvantages of hydrogen combustion.
Virtual visit to an H2 test bench.
In-session digital teaching activity.

FILLING - OVERFILLING — 0.5 day

H2 combustion engine filling functional requirements:

- Richness.
- Cooling: EGR use - Water injection - Crankcase ventilation.

Supercharging systems:

- Possible types of supercharging on a H2 combustion engine.
- Turbocharger operation and technologies.
- Architectures.

MODELING - SIMULATION — 0.5 day

GT SIMULATOR: effect of lambda on cooling and supercharging requirements.

To French entities : IFP Training is referenced to DataDock ; you may contact your OPCO about potential funding.
Please contact our disabled persons referent to check the accessibility of this training program : referent.handicap@ifptraining.com

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