NEXTMOVE
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collaboration is the driver

Electric Vehicle Courses - Mode 2 - intermediate

Duration : 8 hours (2 days)

Member price = 950 €
Non member price = 980 €

Mode 2 - content :
+ Mode 1 - base technical training
+ EV - Thermal Management
+ EV - Practice Module 1 - HV System, connection / disconnection procedure

Duration : 8.00 hours (2.00 days)

Trainee profile

- Personnel with limited direct contact on the EVs HV system (i.e. Project Manager, Group Coordinator...)

Prerequisites

- none

Accessibility and access times

Access time : 2 semaines
Capacity minimum - maximum : 3 to 12 persons

Learning objectives

- To understand how the electrification of combustion vehicles has gradually increased functionality as well as benefits in terms of fuel economy and pollution reduction.
- To know the main components that can be found in hybrid, electric and fuel cell vehicles, as well as their main characteristics.
- To understand the principle of operation of a battery, market developments and the internal structure of the battery pack.
- To discover all types of charging modes and connectors for electric and hybrid vehicles available on the market and the main differences between them.
- Having on overview of the evolution in demand and development of electric motors. Developments in the automotive sector, topologies and future trends
- Having information and awareness-raising on the dangers of electric and hybrid vehicles. Safety measures, equipements and protocol for action in the event of an accident
- Having a review of all active safety systems against electrical hazards in vehicles
- To understand the importance of good thermal management in electric vehicles and its role in electricity consumption

Training contents

- EV Vehicle Types
  - An overview of how the electrification of combustion vehicles has gradually increased functionality as well as benefits in terms of fuel economy and pollution reduction.
  - • Different vehicles types • Interchangeable battery electric vehicle • Electric vehicles • Hybrid vehicles (Serie, parallel, Serie parallel) • Mild hybrid vehicles • Pure hybrid vehicles • Plug in hybrid vehicles • Hydrogen fuel cell electric vehicles
- EV - Main Components
  - An overview of the main components that can be found in hybrid, electric and fuel cell vehicles, as well as their main characteristics.

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- • 12V battery • HV battery • Fuel Cell • HV wiring • Service disconnector switch • Inverter • Electric motor • Mechanical coupler • Super capacitors • DC/DC Converters • PTC heater • A/C eCompressor • On board charger

- EV - HV Battery Systems (module 1)
  - • An overview of the principle of operation of a battery, market developments and the internal structure of the battery pack.
  - • Operation Principle of an Electrochemical Cell • Cell Formats • Fundamental Definitions and Concepts • Li Ion Fundamentals • Thermal Runaway • Ageing Mechanisms • Handling Precaution • Battery Pack Structure • Other HV Components in a Battery Pack
- EV - Charging systems
  - Review of all types of charging modes and connectors for electric and hybrid vehicles available on the market and the main differences between them.
  - • Types of recharging • Recharging modes • Functionalities associated with recharging • Types of connectors (different markets) • High power connection methods (Heavy duty)
- EV - Electric motor types
  - An overview of the evolution in demand and development of electric motors. Developments in the automotive sector, topologies and future trends.
  - • E Motor trend • Technology development priorities • E Motor principle of operation • E Motor Types • Major OEMs choices • A step forward / Future trends
- EV - Safety hazards
  - Information and awareness raising on the dangers of electric and hybrid vehicles. Safety measures, equipment and protocol for action in the event of an accident.
  - • Electrical hazard • Electric shock • Electric arcing • Chemical hazard • Poisoning hazard • Electrolyte spill • High temperature • Deflagration hazard • Fire risk
- EV - Vehicle Safety Features
  - A review of all active safety systems against electrical hazards in vehicles .
  - • IPXXX Protection • Switch SD (Service Disconnect) • HV connector locking mechanism • Power wires characteristics • Isolation Monitoring Device (IMD) • Interlock system • High voltage pyrotechnic fuse • Battery and cells venting valves
- EV - Thermal Management
  - The importance of good thermal management in electric vehicles and its role in electricity consumption.
  - • General description • Main components • Air Conditioning • Cooling System • Battery Thermal Management • Electric Vehicle Thermal Management • Efficiency

Organization of the training course

Pedagogical team
4 Electric Vehicle Experts from IDIADA's EV Training Team

Pedagogical and technical means resources

Follow-up on the implementation of the evaluation of training results

- Presentation
- EV - Practice module 1 PPEs & De energising • Review of PPEs, care and use of them with real examples. Real practice with electric/hybrid vehicles and their components. • Description and use of tools for high voltage jobs (bananas plugs and insulated and non insulated sensors). • Protective equipment. • Description and identification of the high voltage system of an electric and hybrid vehicle. • Disconnection and connection of the high voltage system of electric and hybrid vehicles. • Insulation and earth leakage measurements. • Electric and hybrid vehicle charging.