

NEXTMOVE

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Electric Vehicle Courses - Mode 3 - Advanced

Duration : 12 hours (2 days)

Member price = 1440 €

Non member price = 1500 €

Mode 3 - content :

+ Mode 1 - Base technical training

+ Mode 2 - Intermediate

+ EV - Battery Systems Advanced

+ EV - Control Systems

+ EV - HV Safety regulations

+ EV - Practice module 2 - HV Batteries

Duration : 12.00 hours (2.00 days)

Trainee profile

- Personnel with direct contact on the EVs HV system (i.e. Test Engineer, technician...)

Prerequisites

- none

Accessibility and access times

Access time : 2 semaines

Capacity minimum - maximum : 3 to 12 persons

Learning objectives

- idem Mode 1 + Mode 2
- Having an overview of the principle of operation of a battery, market developments and the internal structure of the battery pack.
- Review of the control systems that make up a vehicle, communication and particularities of the electric vehicle.
- Having an overview of the main electric vehicle type approval regulations and design features to comply with the most important safety aspects.

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.
 - • 12V battery • HV battery • Fuel Cell • HV wiring • Service disconnect 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
- EV - HV Battery Systems Advanced
 - 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 precautions • Battery pack structure • BMS • Thermal management and balancing
- EV - Control Systems
 - Review of the control systems that make up a vehicle, communication and particularities of the electric vehicle.
 - • Introduction to the control systems • Vehicle control system architecture • INPUT System • Start Up system • Powertrain model • Vehicle model • Vehicle controls models
- EV - HV Safety Regulations
 - An overview of the main electric vehicle type approval regulations and design features to comply with the most important safety aspects.
 - - Safety Regulations - Regulation No 100 Approval of vehicles with regard to specific requirements for the electric power train - HV Safety Check Procedure

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 2 HV Batteries Real demonstration of a high voltage battery, opening and detailed view of the equipment that makes up the battery pack and carrying out safety measurements and checks. • Battery check • PPEs for HV Battery works • Voltage measurement • Isolation Test • Battery Pack overview • Battery Cooling system • Relay Box • Battery Management System (BMS) • Modules & Cells • Internal Measures.

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