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INTRODUCTION OF ELECTRIC COMPONENTS USED IN ELECTRIC VEHICLE

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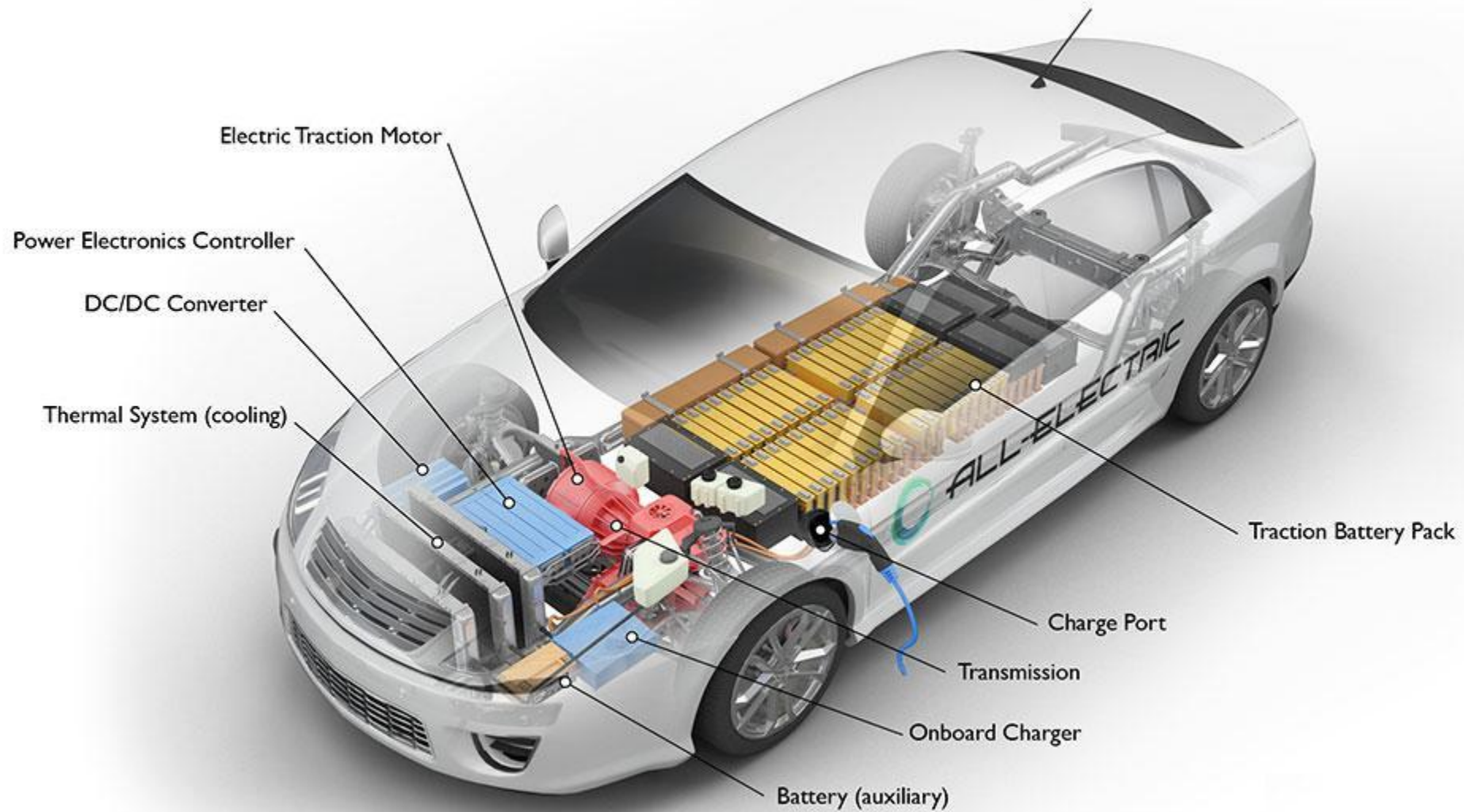


INTRODUCTION OF ELECTRIC VEHICLE

- EVs are vehicles that are either partially or fully powered on electric power.
- Electric vehicles have low running costs as they have less moving parts for maintaining and also very environmentally friendly as they use little or no fossil fuels (petrol or diesel).
- Electric vehicles consists of an electric motor that is powered by a battery pack. The main advantage of electric vehicles is that they emit zero emissions and are eco-friendly.
- They also do not consume any fossil fuels, hence use a sustainable form of energy for powering the car.



All-Electric Vehicle





COMPONENTS USED IN ELECTRIC VEHICLE

The main components of electric vehicles are :

1. Traction battery pack
2. DC-DC Converter
3. Electric motor
4. Power inverter
5. Charge Port
6. Onboard charger
7. Controller
8. Auxiliary batteries
9. Thermal system (cooling)
10. Transmission



TRACTION BATTERY PACK

- Traction battery pack is also known as Electric vehicle battery (EVB) .
- It powers the electric motors of an electric vehicle.
- The battery acts as an electrical storage system.
- It stores energy in the form DC current.
- The range will be higher with increasing kW of the battery.
- The life and operation of the battery depends on its design.
- The lifetime of a traction battery pack is estimated to be 200,000 miles.





DC-DC CONVERTER

- The traction battery pack delivers a constant voltage.
- But different components of the vehicle has different requirements.
- The DC-DC convertor distributes the output power that is coming from the battery to a required level.
- It also provides the voltage required to charge the auxiliary battery.





ELECTRIC MOTOR

- Electric traction motor is the main component of an electric vehicle.
- The motor converts the electrical energy into kinetic energy.
- This energy rotates the wheels. Electric motor is the main component that differentiates an electric car from conventional cars.
- An important feature of an electric motor is the regenerative braking mechanism. This mechanism slows down the vehicle by converting its kinetic energy into another form, and storing it for future use.
- There are basically two types of motors DC and AC motors.





POWER INVERTER

- It converts DC power from the batteries to AC power.
- It also converts the AC current generated during regenerative braking into DC current. This is further used to recharge the batteries.





CHARGE PORT

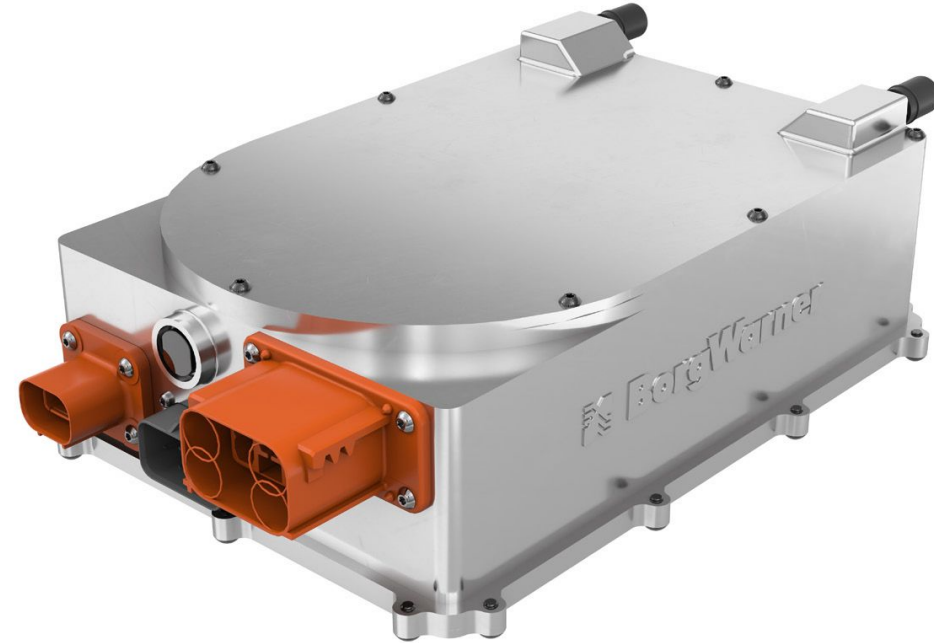
- The charge port connects the electric vehicle to an external supply.
- It charges the battery pack.
- The charge port is sometimes located in the front or rear part of the vehicle.





ONBOARD CHARGER

- Onboard charger is used to convert the AC supply received from the charge port to DC supply.
- The on-board charger is located and installed inside the car.
- It monitors various battery characteristics and controls the current flowing inside the battery pack.





CONTROLLER

- Power electronics controller determines the working of an electric car.
- It performs the regulation of electrical energy from the batteries to the electric motors.
- The pedal set by the driver determines the speed of the car and frequency of variation of voltage that is input to the motor.
- It also controls the torque produced.





AUXILIARY BATTERIES

- Auxiliary batteries are the source of electrical energy for the accessories in electric vehicles.
- In the absence of the main battery, the auxiliary batteries will continue to charge the car.
- It prevents the voltage drop, produced during engine start from affecting the electrical system.





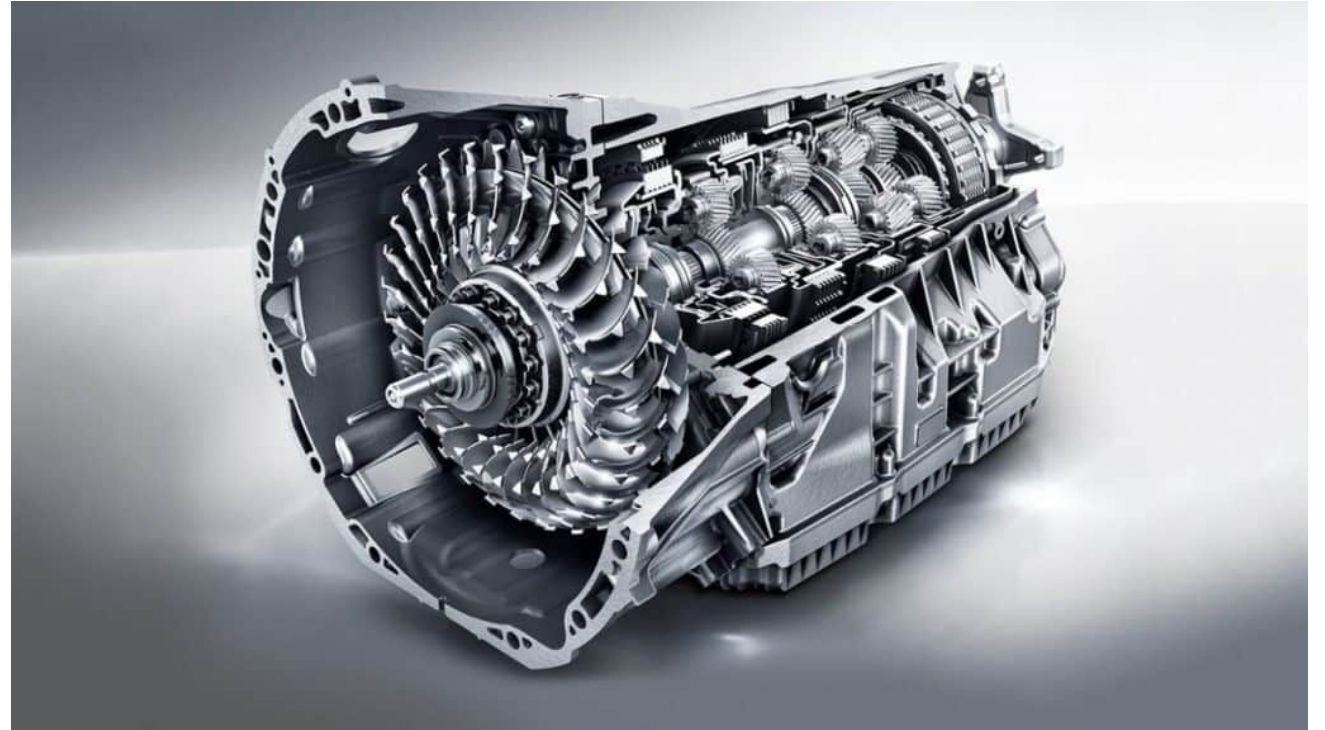
THERMAL SYSTEM(COOLING)

- The thermal management system is responsible for maintaining an operating temperature for the main components of an electric vehicle such as, electric motor, controller etc.
- It functions during charging as well to obtain maximum performance.
- It uses a combination of thermoelectric cooling, forced air cooling, and liquid cooling



TRANSMISSION

- It is used to transfer the mechanical power from the electric motor to the wheels, through a gearbox.
- The advantage of electric cars is that they do not require multi-speed transmissions.
- The transmission efficiency should be high to avoid power loss.





BATTERY MANAGEMENT SYSTEM(BMS)



- The Battery Management System(BMS) manages the battery's many cells so that they can operate as if they are a single entity.
- The EV's battery consists of as little as tens to as many as thousands of mini-cells, and each cell needs to be in a similar condition to the others in order to optimize the battery's durability and performance.
- Most often, the BMS is built into the battery's body, though sometimes it is incorporated into the Electric Power Control Unit(EPCU).
- The BMS mainly oversees the cell's charge/discharge status, but when it sees a malfunctioning cell, it automatically adjusts the power status of the cell(on/off) through a relay mechanism(the conditional mechanism for opening/closing other circuits)



THANK YOU