



Unit 4: Maintenance and Safety of Electric Vehicles and Batteries

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In this meeting:

- Basic technological components : EVs
- Risks associated with EVs and Batteries
 - Rationale for proper maintenance practices and systems
 - Focus: Batteries and Safety
 - Maintenance towards ensuring safety



SES



Basic Technological Features : EVs

Motors



- Electric motor – utilizes electricity and magnetic fields to generate rotary motion
- Moving parts are reduced, significantly reducing maintenance costs
- Can last for very long times

Basic Technological Features : EVs

Batteries



- EVs essentially have disadvantages when it comes to energy storage
- Batteries – electrochemical storage devices
- Different chemistries

Risks Associated with EVs

- Fire Risks
 - Fire while parked
 - Fire while being charged
 - Fire while being driven
 - Crash related
 - Spontaneous ignition
 - Plugged into socket without built-in safety system
- Electrical shocks while charging
- Explosions
- Road crashes



Sources :Christy Leung, 297SHARE, Christy Leung. First Hong Kong-designed electric bus rolls out for a month of test-drives on city's roads | South China Morning Post 2015.; Herron D. Model S catches fire in Norway at Supercharger, charging system seemingly at fault. The Long Tail Pipe 2016. <https://longtailpipe.com/2016/01/01/model-s-catches-fire-in-norway-at-superchargercharging-system-seemingly-at-fault/>

Stressing the Importance of Maintenance

- Ensure safety of the direct users
 - Ordinary users
 - Workers in EV garages/ workshops
- Ensure safety of other road/infra users
- Ensure safety of related infrastructure
- Realizing the benefits of EVs
 - Performance
 - Longevity
 - Cost-effectiveness
 - Sustainability



Ensuring Safety: Batteries

- Battery safety
 - Thermal abuse
 - Physical damage
 - Charge and discharge failures
- Look out! : Battery standards
- Battery management system (BMS)
 - Battery cell monitoring
 - Battery state of charge
 - Battery cell balancing
 - Fault diagnosis
 - Thermal management
 - State of health



Battery standards: Examples

Basic Reminders: Maintenance

- Safety of the electrical system; Safety in the system functions; Safety of the battery
- Adhere to manufacturer's regular inspection and routine maintenance timelines
- Use appropriate charging equipment and adhere to charging procedures
- Updating and calibration of BMS software
- Performance monitoring
- Invest in Training

Maintenance: Your first tool towards ensuring safety

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