

CONFIDENTIAL

# Training Module: Electric Motor and Battery Application for EVs

## **Title: Understanding Electric Motors & Battery Applications in EVs**

Objective: To provide participants with a comprehensive understanding of electric motor technology and battery systems used in electric vehicles (EVs), including their applications, maintenance, and best practices.

## **Training Details**

- Duration: 3 days
- Target Audience: Engineers, automotive professionals, Technicians, and EV owners

## **Course Modules:**

#### **1. Introduction to Electric Motors in EVs**

- Types of electric motors used in EVs (e.g., BLDC, PMSM, Induction Motor)
- How electric motors work in an EV drivetrain
- Key components: Stator, rotor, controller, and inverter
- Comparison of different motor technologies

#### 2. Understanding EV Battery Technology

- Types of EV batteries (Li-ion, LFP, Solid-state, etc.)
- Battery capacity, voltage, and energy storage principles
- Factors affecting battery performance and efficiency
- Battery Management Systems (BMS) and safety features
- **3. Application of Electric Motors in EVs**
- Torque and power characteristics of EV motors
- Efficiency optimization for performance and range
- Regenerative braking and its impact on energy recovery
- Motor cooling and thermal management strategies

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4. Battery Charging & Maintenance Best Practices

- AC vs. DC charging and fast-charging technologies
- Charging cycles and their impact on battery lifespan
- Proper battery storage and maintenance techniques
- Understanding State of Charge (SoC) and Depth of Discharge (DoD)
- 5. Troubleshooting & Diagnostics
- Common issues in EV motors and batteries
- Diagnosing battery degradation and motor failures
- Importance of software and firmware updates
- Predictive maintenance and smart monitoring systems
- 6. Future Trends in EV Motor & Battery Technology
- Next-generation battery materials and their potential impact
- Advancements in motor efficiency and integration
- Emerging EV technologies (solid-state batteries, wireless charging, etc.)
- Sustainability and recycling of EV components

#### Hands-On Activities (Optional)

- Live demonstration of an electric motor operation
- Battery diagnostic tool usage and data analysis
- Real-world case studies on EV motor performance
- Charging station visit and practical session

#### Why Attend This Training?

- Gain practical knowledge on EV motor and battery systems
- Learn from industry experts and real-world case studies
- Understand how to maximize efficiency and prolong battery life
- Network with professionals in the EV industry

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## EV Motor & Battery Training – Tentative Schedule (60% Practical Focus)

#### Day 1: Motors & Batteries – Fundamentals + Hands-On

- 9:00 9:30 am: Registration & Opening Session
- 9:30 10:30 am: Theory: Introduction to EV Motors (types, working principle)
- 10:30 10:45 am: Morning Break
- 10:45 12:30 pm: Hands-On: Motor teardown & component identification
- 12:30 1:30 pm: Lunch Break
- 1:30 2:15 pm: Theory: Battery Types & Characteristics
- 2:15 3:45 pm: Hands-On: Battery packs & diagnostic tool usage
- 3:45 4:00 pm: Afternoon Break
- 4:00 5:00 pm: Group Activity: Motor vs. Battery Matching Challenge

Day 2: Application & Maintenance (Hands-On Heavy)

- 9:00 10:00 am: Theory: Torque, regen braking & cooling strategies
- 10:00 10:15 am: Morning Break
- 10:15 12:30 pm: Hands-On: Motor control with inverter setup
- 12:30 1:30 pm: Lunch Break
- 1:30 3:30 pm: Hands-On: Battery charging demo: AC, DC, Fast-Charge
- 3:30 3:45 pm: Afternoon Break
- 3:45 5:00 pm: Case Study: Efficiency optimization walkthrough

#### Day 3: Diagnostics, Trends & Site Visit

- 9:00 10:00 am: Theory: Troubleshooting & Future Trends
- 10:00 10:15 am: Morning Break
- 10:15 12:00 pm: Hands-On: Predictive maintenance using software tools
- 12:00 1:00 pm: Lunch Break

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- 1:00 3:30 pm: Site Visit / Lab Walkthrough: Charging station + EV system demo
- 3:30 4:00 pm: Wrap-Up: Group Reflection & Discussion
- 4:00 4:30 pm: Certificate Distribution & Closing

#### **Practical Activities Include:**

- Disassembling motors
- Battery diagnostic tools
- Real motor/inverter control
- Live charging simulations
- Site visit or EV system walkthrough

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