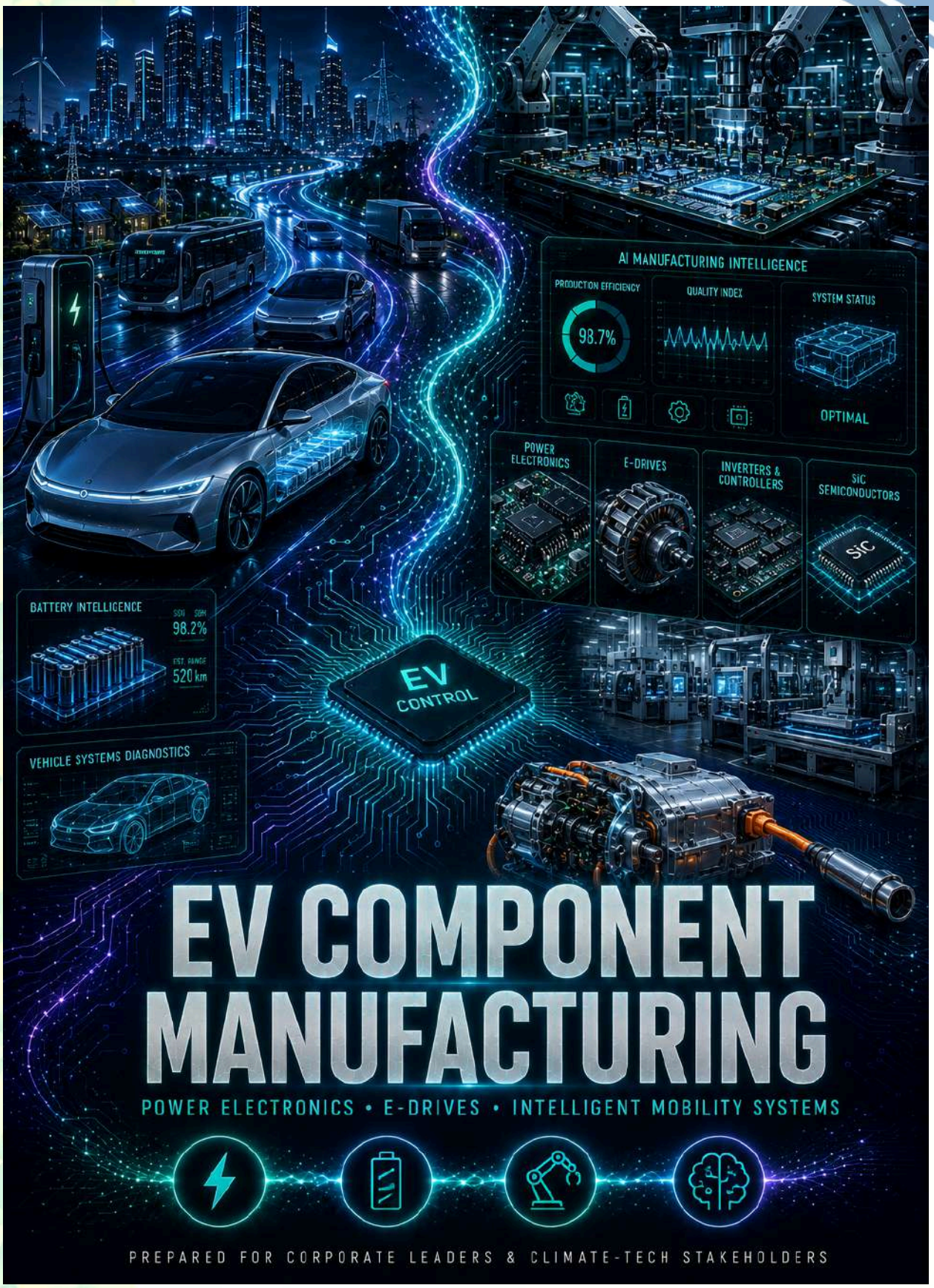
AI MANUFACTURING INTELLIGENCE
PRODUCTION EFFICIENCY
98.7%
QUALITY INDEX
SYSTEM STATUS
OPTIMAL
POWER ELECTRONICS
E-DRIVES
INVERTERS & CONTROLLERS
SiC SEMICONDUCTORS
SiC
BATTERY INTELLIGENCE
98.2%
520 km
EV CONTROL
VEHICLE SYSTEMS DIAGNOSTICS
EV COMPONENT MANUFACTURING
POWER ELECTRONICS • E-DRIVES • INTELLIGENT MOBILITY SYSTEMS
PREPARED FOR CORPORATE LEADERS & CLIMATE-TECH STAKEHOLDERS

Mobility

EV Component Manufacturing

This section provides key inputs on EV Component Manufacturing Opportunities for corporate leaders.

Opportunity Snapshot: EV Component Manufacturing

Manufacture key EV components such as electric motors, controllers & drivetrain systems

Market Signal

- EV growth driving demand for localized component supply chains
- Strong policy push via **PLI schemes for auto and ACC batteries**
- **Annual Market size by 2030:** 20,000 - 25,000 ₹ Cr

What Makes or Breaks It?

- **Cost-competitive manufacturing** at scale
- **Technology capability** in power electronics (inverters, BMS, controllers)
- **Strong OEM partnerships** for long-term supply contracts

Why It Matters NOW?

- OEMs **pushing for localization** to reduce costs and supply risks
- **Rapid scaling in 2W/3W EV** segments and fleet adoption
- Opportunity to **integrate into global EV supply chains**

Well Aligned Opportunity for

- **Auto component manufacturers** (Tier 1 / Tier 2 suppliers)
- **Electronics and semiconductor players**
- **Battery and powertrain startups**

Key Challenges

- Dependence on imported cells, chips, and rare earth materials
- **Rapid tech evolution** (motor types, controllers, battery formats)
- **High quality and reliability standards** for OEM integration

Business Model

- Localize high-value components (motors, controllers, BMS)
- Partner with OEMs for platform-level supply agreements
- JV with global tech players for advanced components

Introduction and Business Case

EV component manufacturing spans motors, controllers, inverters, power electronics, axles, chargers and thermal systems — the backbone of the EV value chain beyond batteries. Localising these components cuts import dependence, reduces costs and creates a robust domestic supply base.

With India's EV market set to surge, component manufacturing represents both a large industrial opportunity and a strategic necessity for self-reliance under *Atmanirbhar Bharat*.

Market Potential for EV Component Manufacturing in India

Estimates for market potential provided below are for non-battery EV components, mainly motors, inverters, chargers and charge controllers and power train components such as axles.

Year	Market Size (₹ Cr)	Drivers
2025	4,000-5,000	Demand from 2W/3W OEMs; FAME-II localisation mandates.
2030	20,000-25,000	Scale-up in 4W EVs, buses, CVs; localisation of drivetrains & electronics.
2040	1,10,000-1,30,000	Deep EV penetration; India as an export hub for global supply chains.

Market Segments and Applications

Segment	Applications	Business Model	Key Drivers
Integrated e-drive systems	Motors, inverters, gearboxes	Tier-1 system supply to OEMs	OEM push for compact, integrated propulsion
Power electronics (inverters, converters)	Traction control, energy conversion	High-volume component supply	Efficiency, range, and cost pressure
Electric traction motors	Passenger & commercial EVs	Standardized motor platforms	Global EV volume growth
Power semiconductors (Si / SiC)	Inverters, onboard chargers	Semiconductor manufacturing + long-term OEM supply	Shift to high-efficiency SiC architectures

Onboard chargers & DC-DC converters	Vehicle charging & power distribution	Modular power electronics platforms	Fast-charging adoption
Thermal management systems	Battery, motor, cabin cooling/heating	System integration with vehicle platforms	Battery performance & durability needs
E-axles & drivetrain modules	Integrated motor-drive-axle units	Plug-and-play drivetrain solutions	OEM demand for faster EV development
Contract EV component manufacturing	OEM-designed subsystems	Build-to-spec manufacturing services	OEM asset-light strategies
Software-enabled EV components	Controls, diagnostics, OTA-ready hardware	Component + software monetization	Software-defined vehicle transition

Typical Project Capacities & Investments Required in India

Component Line	Typical Capacity (annual)	Indicative CapEx (₹ Cr)	Notes
Traction Motors (PMAC/IPM/Induction)	100k-300k units	120-300	Stator/rotor machining, winding, magnet insertion, end-of-line dynos.
Inverters / Power Electronics (Si/SiC)	100k-250k units	100-220	SMT + power module assembly, potting, burn-in; SiC adds test complexity.
e-Axles (motor+inverter+gearbox)	50k-150k units	250-600	Precision gear line, assembly & NVH labs; OEM validation heavy.
Onboard Chargers (3.3-22 kW) & DC-DC	150k-400k units	60-150	SMT + power stages; automotive-grade reliability testing.
Thermal Systems (liquid plates, chillers, pumps)	150k-400k packs-equivalent	40-120	Vacuum brazing, leak/pressure tests, coolant validation.
Wiring Harness & Busbars	300k-800k sets	25-70	Crimping, overmoulding, HV insulation/hipot test.
Connectors/Relays /Contactors (HV/LV)	500k-1,500k units	30-100	Tooling-intensive; UL/IEC automotive certifications.
Transmission / Gear Sets (EV)	80k-200k units	120-280	Gear cutting, hardening, grinding, clean-room assembly.

Telematics/VCU/ECU	250k-700k units	25-60	Electronics + embedded software; cybersecurity testing.
DC Fast Chargers (30-180 kW)	5k-20k units	30-90	Power stacks, dispensers, safety; field service network key.
Die-cast/Stamped Enclosures	10k-50k tonnes	150-350	Giga/HPDC presses, toolroom; also serves battery/PCS housings.

Underlying Technologies & Processes

Element	Options	Key Traits
Motors	BLDC, PMSM, induction, hub motors	Efficiency, torque, cost trade-offs across segments.
Controllers & Inverters	Si/SiC-based electronics	SiC improves efficiency, reduces losses, critical for fast charging.
Power electronics	DC-DC converters, onboard chargers	Enable safe, efficient charging and power flow.
Thermal management	Air-cooled, liquid-cooled, phase change	Keeps batteries & motors within safe limits.
Transmission & axles	Integrated e-axles, gear reduction systems	Improve compactness and efficiency.
Charging hardware	Portable AC chargers, DC fast chargers	Localisation cuts costs, ensures compatibility.
Integration	Software + hardware co-design, BMS links	Defines overall efficiency and reliability.

Key Challenges

Challenge Area	Key Issues	Business Impact	India Specific	Strategic Implications
Supply Chain Localization & Import Dependency	Dependence on imported electronics, semiconductors, magnets, and advanced materials	Cost volatility and supply disruptions	China-dominated supply chains; geopolitical risks affecting sourcing	Develop local vendor ecosystem and multi-source procurement strategies
Rapid Technology Evolution &	Frequent changes in EV architectures,	Risk of product obsolescence and stranded	Diverse OEM standards; evolving	Flexible manufacturing lines and modular

Platform Changes	battery systems, and power electronics	investments	vehicle platforms	component designs needed
Demand Uncertainty & OEM Concentration Risk	Component demand tied closely to EV adoption rates and OEM production cycles	Revenue volatility and capacity utilization risks	Policy-driven market growth; varying adoption across vehicle segments	Diversify across 2W, 3W, passenger, commercial EVs, and stationary storage components
Cost Competitiveness & Margin Pressure	Price pressure from OEMs and competition from global suppliers	Thin margins for Tier-2/Tier-3 manufacturers	Scale advantages of global players; high tooling and certification costs	Move up value chain into high-tech components (BMS, software-integrated electronics)
Capital Requirements & Quality Compliance	Investment needed for automation, testing, certification, and safety standards	Increased upfront costs and longer ROI timelines	Strict automotive standards (AIS, ISO); skilled workforce shortages	Invest in advanced manufacturing capabilities and quality systems early

Prominent Players in the Indian Market

Company / Entity	Focus Areas
Bosch India	Motors, inverters, controllers for 2W/4W EVs.
Valeo India	Powertrain components, onboard chargers.
Mahle Electric Drives	E-motors and drive systems.
Lucas TVS	Hub motors, controllers; partnerships with 24M for advanced systems.
Minda Industries (UNO Minda)	EV-specific switches, controllers, charging components.
Sona Comstar	EV driveline, hub motors and differential assemblies.
Rico Auto, Musashi Auto	Transmission and drivetrain parts.
Exicom Tele-Systems	Charging and power electronics.

Innovation Perspectives

Innovation	Business Opportunity	For Senior Management
Integrated e-drive platforms	Platform supply contracts across multiple OEMs	Fewer parts, lower cost, faster OEM adoption
Power-electronics leadership (SiC)	SiC module fabs, long-term supply lock-ins	Step-change in range and charging speed
Software-defined components	Component-plus-software subscriptions	Recurring revenue beyond part sales
Standardized EV component platforms	Global standardized component ecosystems	Scale economics and faster time-to-market
Thermal systems as performance enablers	Premium thermal platforms for EV OEMs	Direct impact on range, safety, and fast charging
Component modularization for OEM speed	EV kit" subsystems for new entrants	Reduces OEM engineering burden
Semiconductor–component vertical integration	Chip-to-system integration platforms	Supply security + performance tuning
Component data & diagnostics platforms	Predictive maintenance & analytics services	Improves reliability and lifecycle value
Low-carbon & traceable components	Green-premium component contracts	Meets OEM Scope-3 and regulatory needs
Contract manufacturing for EV subsystems	EV component manufacturing services	Flexible capacity and faster scaling

Concentric & Satellite Opportunities

- Motor, inverter & e-axle suppliers: Concentric Tier-1 ecosystem producing high-efficiency drivetrains, SiC inverters and integrated e-powertrains for OEMs.
- Thermal management & enclosure fabricators: Local manufacturers of cooling plates, housings and battery-safe materials designed for tropical climates.
- Connector, harness & power electronics vendors: Domestic supply chains for HV connectors, relays and busbars to reduce import dependency.
- Testing, validation & certification labs: Facilities for EMC, NVH and functional safety ensuring automotive-grade reliability and export readiness.
- Automation & tooling service providers: Firms building specialised assembly lines, robotics and precision dies for EV component mass production.

- Software & firmware engineering firms: Satellite innovators creating motor control, BMS and VCU software IP for domestic and export markets.
- Circular supply chains & recycling partnerships: Collaboration with recyclers for copper, aluminium and magnet recovery to close material loops.

Key Takeaway for Senior Management

Takeaway	Details
Value concentrates in a few "system-defining" components—not across all parts	• Margins and bargaining power accrue to components that define vehicle performance and safety • ***Examples**:* battery packs & BMS, e-axles, inverters, power modules (SiC), thermal management • **Recommended innovation focus:** system-level engineering and performance optimization • **Highlight:** suppliers of system-defining components become strategic partners, not price-takers
Automotive-grade quality and reliability are the real entry barriers	• OEM qualification cycles, PPAP, ASPICE/ISO, and long-term warranties create high switching costs • ***Sub-components**:* functional safety (ISO 26262), EMC compliance, lifecycle testing, traceability
Platform reuse beats single-model customization	• Components designed for reuse across 2W/3W/PV/CV platforms scale faster and cheaper • ***Examples**:* modular inverters, standardized e-axles, scalable BMS architectures • **Recommended innovation focus:** modular, software-configurable component platforms • **Competitive advantage:** higher volumes per SKU and lower capex per program
Software is increasingly embedded in hardware value	• Control algorithms, firmware, diagnostics, and OTA capability drive differentiation • ***Examples**:* motor control software, inverter firmware, BMS analytics, predictive maintenance • **Competitive advantage:** recurring revenue, data moats, and customer lock-in

Next Steps for Corporate Leaders

EV component manufacturing is moving into an expansion phase as electrification accelerates across two-wheelers, three-wheelers, commercial fleets, and passenger vehicles. Localization trends, supply-chain resilience priorities, and government incentives are creating opportunities for new entrants and existing automotive suppliers.

This could be an attractive climate tech opportunity for industries and firms in specific sectors and industries keen on catering to this market.

Connect with Team EAI to know more about this opportunity and take your corporate's initial steps. Send a note to consult@eai.in or talk to Muthukrishnan - 9952910083