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To be a global supplier of the EV Power electronics component providing a differentiated service

EV/FCEV Components

Energy Storage

Smart Junction Box

YOUNG HWA

YOUNGHWATECH Co., Ltd.

COMPANY OVERVIEW

Company Overview

Company Name	YOUNGHWA TECH Co., Ltd.
Location	#132 Asanvalley-ro, Asan-city, Chungnam-province, Korea (Republic of)
Establishment	Aug-9th, 2000
Employee	200 persons (42 Engineers)
Main customer	GM, HYUNDAI, SYMC, RSM, LGE
Main product	Junction Box (SJB+CAN), EV Components, Battery-related products, Automotive electronics
Certification	ISO/TS16949, ISO9001, ISO14001

Business and Development Roadmap

Highlights

- **2018** • Establishment of New Engineering Center in China
- **2017** • Listed on KOSDAC
- **2015** • Establishment of Shenyang Plant in China
- **2013** • Awarded "2013 Korea Technology Awards"
- **2012** • Awarded "GM 2011 Supplier of the year" Prize
- **2011** • Moved HQ to Asan Techno-valley
- **2006** • Launching Smart Junction Box(SJB) for In-vehicle network system
- **2000** • Establishment of YOUNGHWA TECH Co., Ltd.

Major Customers

HOLDEN · SHANGHAI GM · GM · Cadillac · CHEVROLET · Mercedes-Benz · HYUNDAI · BUICK · KIA MOTORS · Mahindra · Hanwha Techwin

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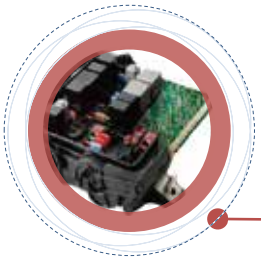
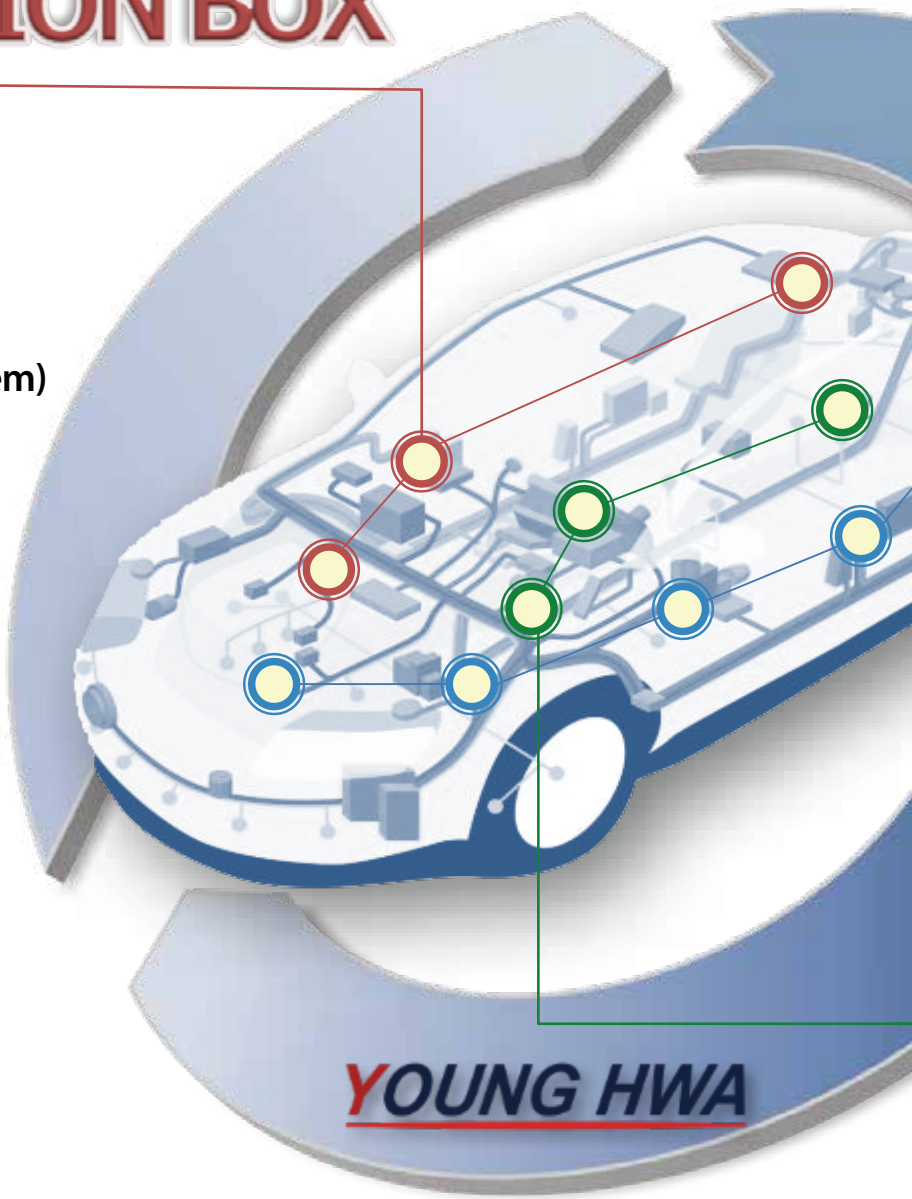
Technology, Quality and
To become a



JUNCTION BOX

- Fuse Box
- Junction Box
- BDU
- Smart Junction Box (SJB)

CAN (In-Vehicle Network System)

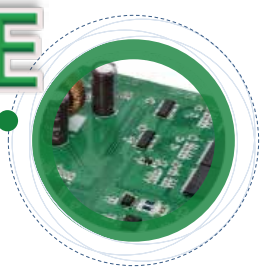


Customer Satisfaction
leading EV Auto Parts Supplier

EV/FCEV COMPONENTS

- Electronic Vehicle Component
- Fuel Cell Electronic Vehicle
  Commercial Vehicle Component
- EV Sub Component

ENERGY STORAGE



- Secondary Battery Parts
- ESS Reuse
- Battery Management System

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EV COMPONENT

Low DC/DC Converter (LDC)

- Converting DC input voltage to another voltage at low power
- 1.8kW, 2.4kW, 3.3kW, 4.5kW, 7kW, 10kW

On-Board Charger (OBC)

- Converting AC input voltage to DC voltage
- 3.3kW, 6.6kW, 11kW

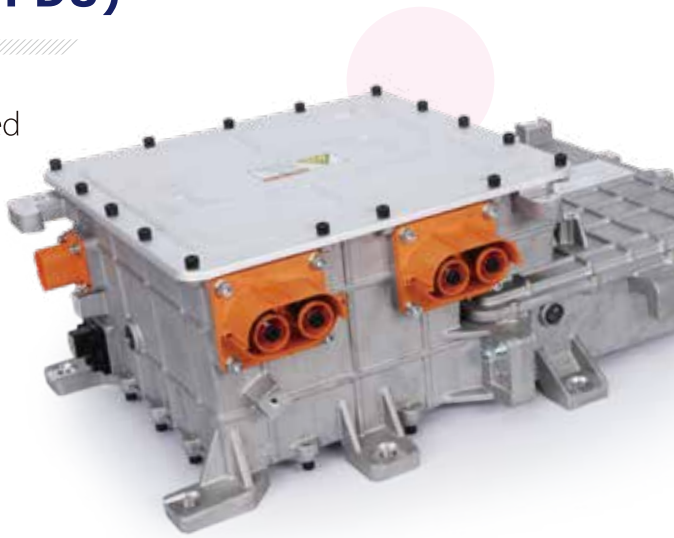
Power Distribution Unit (PDU)

- Converting received AC current into DC and charges the battery
- High voltage distribution and circuit protection

INTEGRATED MODULE

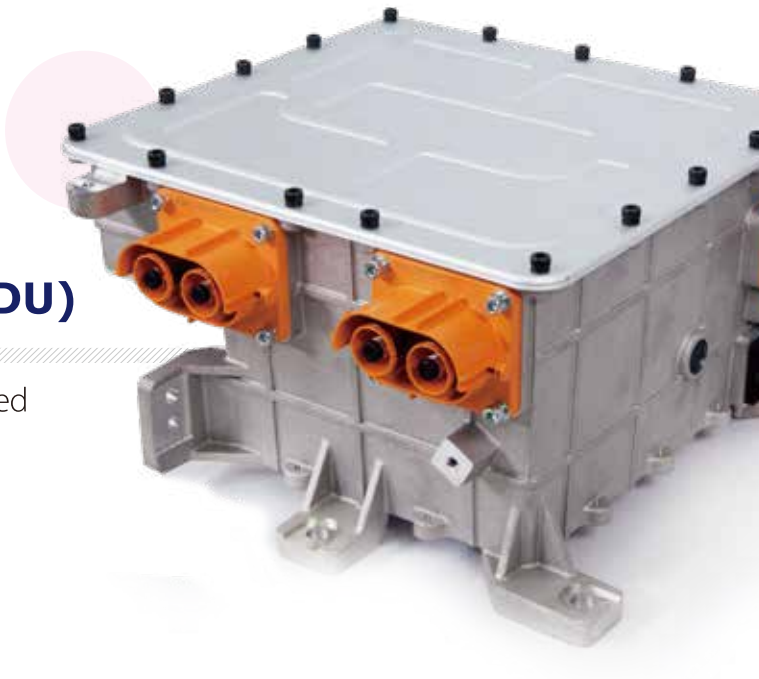
Integrated Module (LDC+OBC+PDU)

- High voltage module with LDC, OBC, and PDU integrated
- Reduced the Length of the high voltage cable used
- Reduced the Radiated Emission (RE)
- Reduced the overall size
- Optimized assembly capability



Integrated Module (LDC+OBC)

- High voltage module with LDC and OBC integrated
- Reduced the number of connectors used
- Reduced the overall size and weight
- OBC(3.3kw)+LDC(1.4kw), OBC(6.6kw)+LDC(1.8kw)



Integrated Module (LDC+PDU)

- High voltage module with LDC and PDU integrated
- Reduced the Radiated Emission (RE)
- Reduced the overall size

EV COMPONENT

FCEV 100kW Bidiretional Converter(BHDC)

- Power converting device from DC 800V(Batt Voltage) to DC 205V ~ 450 V(Fuel Cell Voltage)
- High efficiency and bi-directional technique

FCEV 7kW Converter(LDC)

- Power converting device from DC 720V(High Voltage) to DC 28V(Low Voltage)
- High efficiency and insulation technique

Commercial Vehicle-4.5kW Converter(24V)

- Power converting device from DC(High Voltage) to DC(Low Voltage)
- High efficiency and insulation technique

EV SUBCOMPONENT

SSR (Solid State Relay)

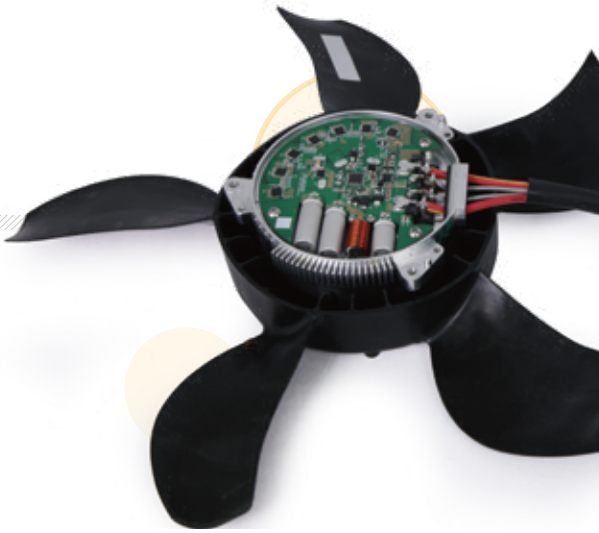
- High voltage high current circuit breaker for temperature control of high voltage battery pack
- High switching speed, less noise, and longer life time (400Volt /10A, Ultra 12V/30A, 20A, Mini 12V/5A)

IBS (Intelligent Battery Sensor)

- Battery sensor of 12V lead-acid battery(Flooded Type, AGM Type)
- SOC, SOH,SOF for Energy management and ISG (Idle stop & go) (60A, 70A, 80A)

CFM (Cooling Fan Module)

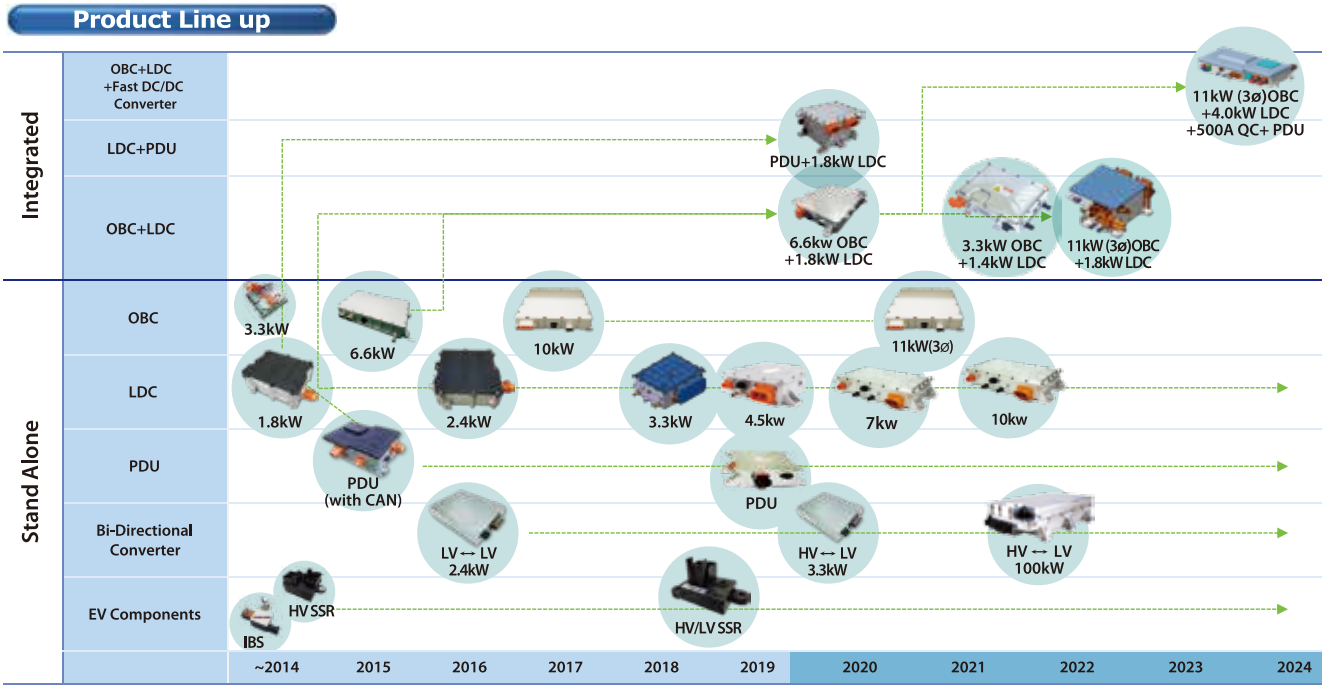
- PID controls the target RPM of the BLDC motor based on the information received from the engine ECU (400Watt ~ 800Watt)



EV/FCEV PRODUCTION STATUS

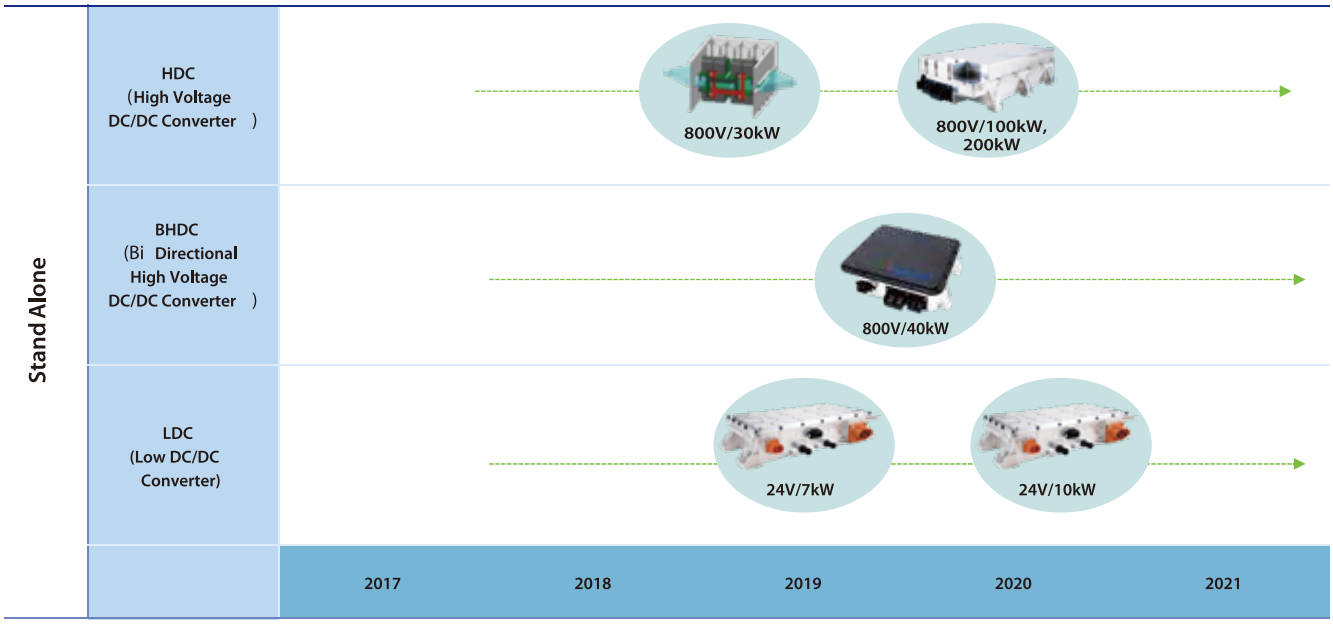
EV Component

Product Line up



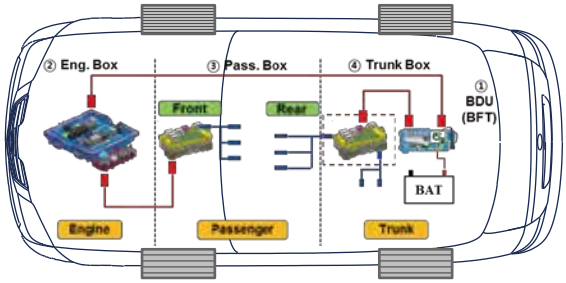
FCEV Component

Product Segment



JUNCTION BOX

Junction Box Development Phase



Phase 1

Junction Box
- Power PCB Type

- ONE Bolt type

- Lever type

Phase 1.5

CCC(Corporate Common Component)

Phase 2

Smart Junction Box(SJB)
Junction Box **+ BCM(Body +CAN(Multi flexing)**

- Commercial Box

- UEC Vehicle

Future

In-Vehicle Network
(SJB + Ethernet + Gateway)

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JUNCTION BOX

Power PCB Type

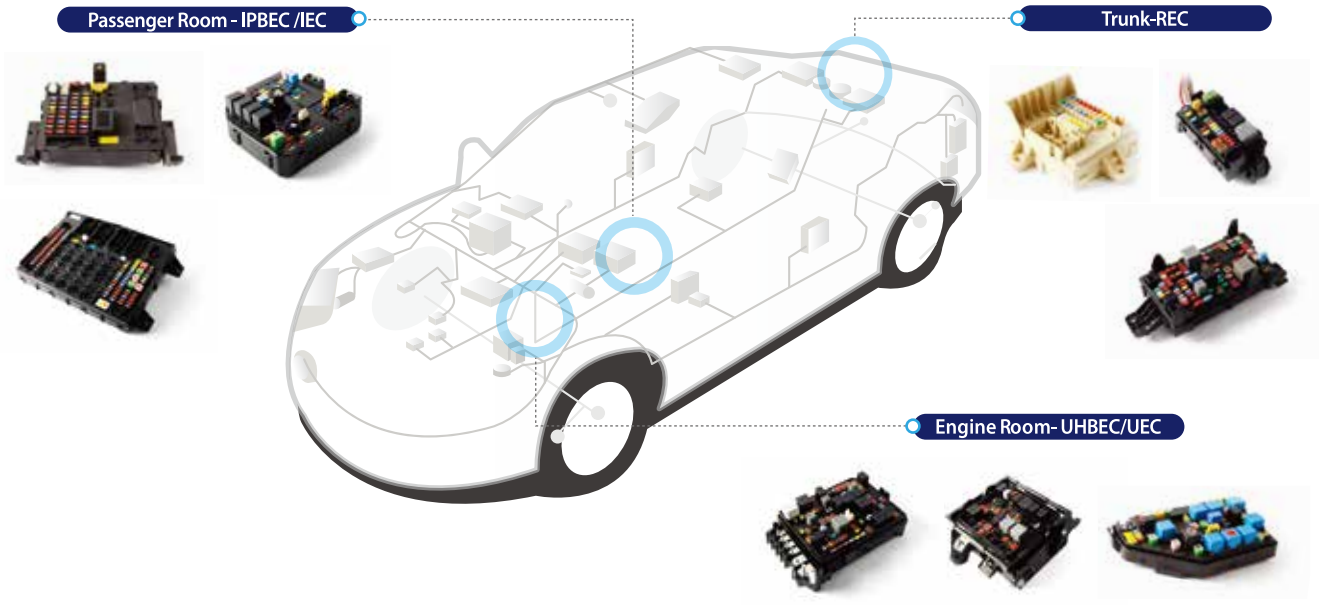
- Distributes Power and protects the circuit
- No additional linkage structure needed for harness integration
- PCB type

Smart Junction Box

- Multi-functional high-end junction box (BCM and CAN communication)
- Distributes Power and protects the circuit
- PCB type + CAN Communication

Installation Position

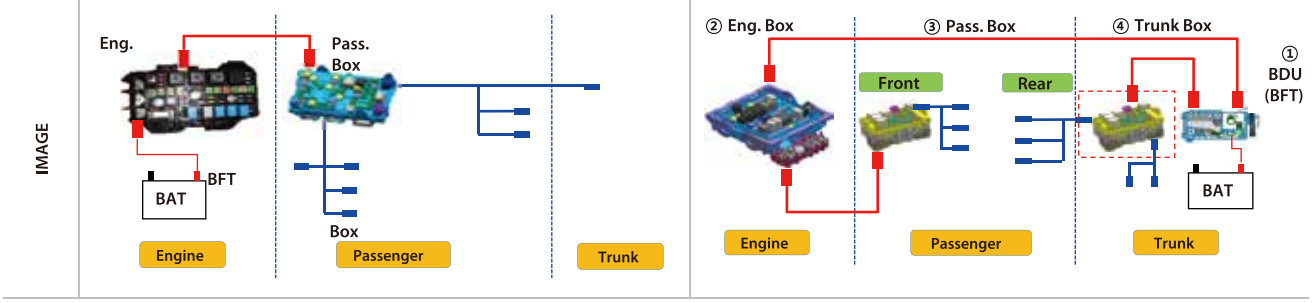
- Junction Box is distinguished by its installation position



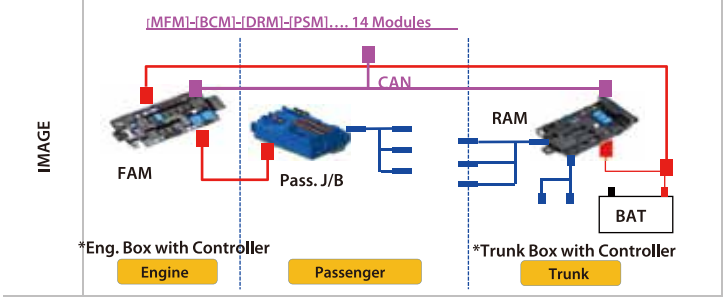
JUNCTION BOX

Smart Junction box structure

One	Layout 1	Two	Layout 2



Three	Layout 3



*BFT: BAT Fuse Terminal
Most Common Layout

*FAM: Front Area Module
*RAM: Rear Area Module
Fuse Boxes In Vehicle Network

*BDU: BAT Distribution Unit
;Almost same function like BFT but more fuses
Primary Circuit Protection by BDU

Junction box Mass product

Mini Cars (Segment-A)	Small Cars (Segment-B)	Medium Cars (Segment-C)	Large Cars (Segment-D)	Executive Cars (Segment-E)	SUVs (Segment-J)	Commercial Cars (Truck, BUS)

SECONDARY BATTERY PARTS & ENERGY STORAGE SYSTEM

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Battery Pack Design Capabilities & Experiences

CELL

- Polymer, Circle, Square Type
- Lithium Oxide(NCM), Lithium-Iron phosphate(LFP) Cells
- Korea Cells and China Cells

01

MODULE

- CMA (Cell Module Ass'y)
- Slave BMS
- Sensor

02

BATTERY PACK

- CMA (Cell Module Ass'y)
- Slave BMS
- Sensor
- SENSOR, HVIL

03

Mechanical Design

Requirement (Input)	**Design** (Output)
• Environmental conditions	• Vibration/IP index
• Mechanical Abuse conditions	• Insulation/Isolation/Safety
• Electrical Abuse conditions	• Robustness
• Thermal Abuse conditions	• Heat dissipation
• Dimension & Packaging	• Cooling Type
	• Module Configuration
	• Protection @ abuse conditions

Battery Management System (BMS)

Master & slave BMS

Master BMS

Slave BMS

- Monitor & manage the battery cell condition and protects battery operation

SECONDARY BATTERY PARTS & ENERGY STORAGE SYSTEM

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Energy Storage(Batter Reuse)

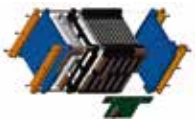
01 Used Battery

(Hyundai / KIA)

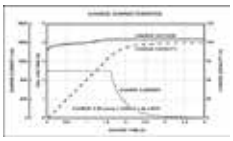
02 Battery Analysis

03 Module Separate

04 Module Separate



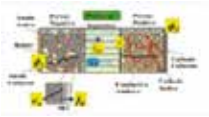
Charge/Discharge



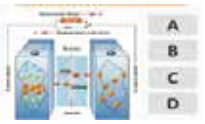
08 BMS Reconstruction

07 Battery Analysis

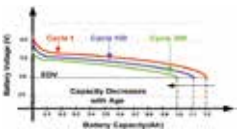
06 Module Separate



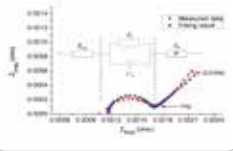
05 Module Separate



Charge/Discharge



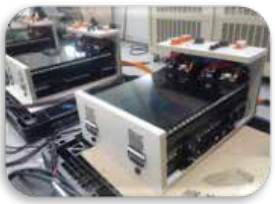
Charge/Discharge



TYPE 1

TYPE 2

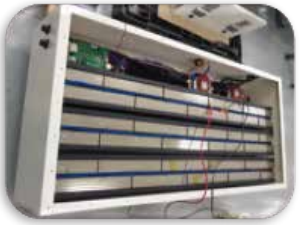
NEV Projeect



NEV (Park)

HEV (Tractor)

NEV (Airport)



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Global network

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