Electric Vehicles Workshop
Day 1 – Oct 25, 2021

EV Battery Systems

Romeo Power

POWERING THE WORLD'S TRANSITION TO ELECTRIFICATION

The National Academies of SCIENCES ENGINEERING MEDICINE

ROMEO POWER

OCT | 2021

We Are

ROMEO POWER

- A Leader in Battery Technology with Industry Leading Hardware, Software and Thermal Management
- Attractive and Large Commercial Vehicle TAM
- World-class Partnerships and Strategic Players
- Fully Assembled in North America

Blue Chip Customer Base

Peterbilt · HEXAGON PURUS · OSHKOSH · BorgWarner · REPUBLIC SERVICES · CCC A BATTLE MOTORS COMPANY · BATTLE MOTORS · GreenPower MOTOR COMPANY · Etruck · CASCADIA MOTION

KENWORTH. The World's Best. · PACCAR · THE LION ELECTRIC CO · BLUE BIRD · LIGHTNING eMOTORS · LONESTAR TRUCK GROUP · NIKOLA MOTOR COMPANY · Phoenix MOTORS INC · REE · VITA

Core Focus on Battery modules, packs, and systems

Battery Engineering

Raw Inputs & Cell Expertise

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Vehicle Expertise

Upstream	Raw Materials
	Refined Active Materials
Midstream	Cell Manufacturing
Downstream Is Our Core Competency	Battery Modules / Packs
	BMI-AI[1]
End Products	HP EVs
	Commercial EVs
	Specialty EVs
	Passenger EVs

How Does Romeo Power's Technology Enhance EV Performance?

Cell Science Design and Engineering	▪ Romeo Power performs extensive independent evaluation of cells and closely collaborates with industry leading cell manufacturers at early development stages of next generation cell technology ▪ Cell selection process based on energy density, quality and safety standards
Modular / E-Plate Technology & Electro-Mechanical Engineering	▪ Designed for durability and crashworthiness; fulfills requirements for volume production such as manufacturability and serviceability ▪ Modules are designed to meet the highest safety standards and have undergone extensive testing and broad-based customer validation
Thermal Engineering	▪ Designed for consistent temperature distribution within and among all battery cells guaranteeing lifetime maximum battery performance
Battery Management System (BMS)	▪ Creates a singular platform enabling all customers to benefit from field testing of electronic and software for prototypes through scaled deployment ▪ Established safety measures system, including isolation monitoring, high voltage interlock, manual service disconnect, hardware and software protections
BMI-AI[1]	▪ Maximize total fleet battery health by leveraging machine learning to help reduce total cost of ownership ▪ Learn aging factors from field behavior based on feedback from battery population health optimization ▪ Provide individual decisions that benefit net total asset and increased profitability of fleet managers, and total cost of ownership

Mass Production

[1] Brain Machine Interface - Artificial Intelligence

Battery Systems Overview

1 Cell Science

- Cell procurement is a carefully guided process with rigorous testing and validation processes to ensure only the best cells are selected
- Romeo Power's packs and modules are cell-agnostic, allowing the company to use only the best for each application, and adapt and change as new cells come to market

2 Module Technology

- Flexible and customizable design acts as a building block which allows for custom packs without needing months / years of additional R&D for each prototype
- Modules are designed to meet the highest safety standards and have undergone extensive testing and broad-based customer validation, both at the individual pack and module level

3 Pack Technology

- Mechanical pack design addresses key requirements – from durability and crashworthiness to manufacturability, serviceability, and recyclability
- Flexible design allows the company to reach significant scale and a broad range of customer needs without incurring significant additional costs and overhead

4 BMS

- Battery management system serves as complete solution for monitoring and control
- Romeo Power's BMS are built on a highly configurable platform, allowing it to support a wide variety of architectures, and driving lower cost and a faster time to market when compared to peers

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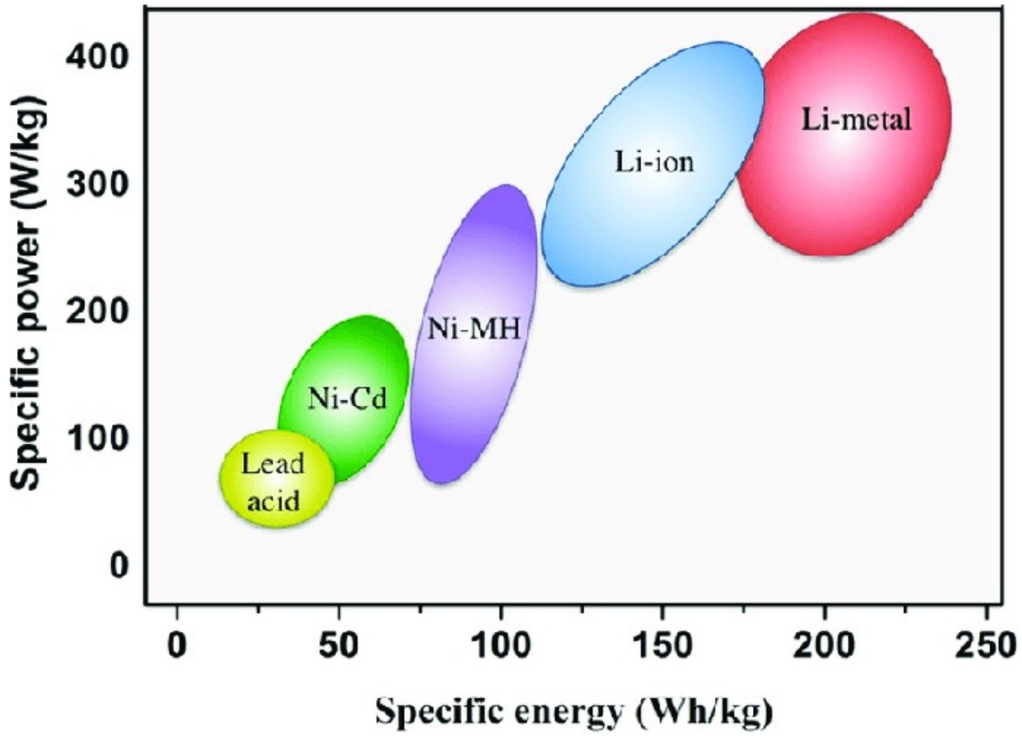
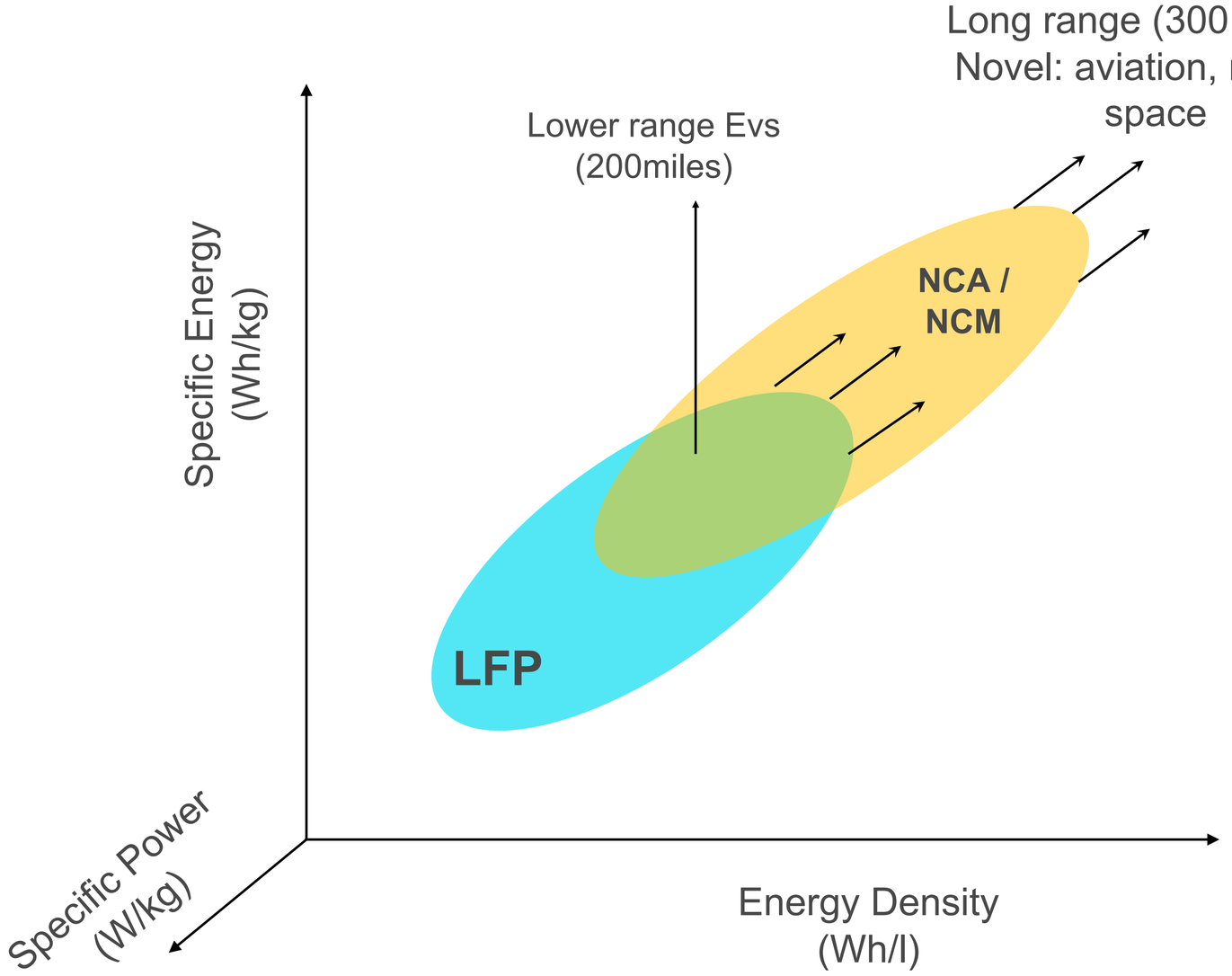
Continuous improvements in LFP chemistry becoming more attractive to EVs
Longer range vehicles and novel applications require NCM/NCA





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EV Cells chemistry:

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Cell Formats:

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Modules:

Small format module (3kWh):

Large format modules (10 to 30 kWh):

Packs:

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KPIs for Battery Systems & Safety

	Cells	Packs
Energy Density (Wh/l)	700 to 760	197 - 210
Specific Energy (Wh/kg)	240 to 265	160 - 200
Power density (W/kg)		667 - 1200
Charge time (min/SOC)		1.5 hrs to 80%
Cycle Life	1000 to 4000	1000 to 4000
Propagation rate (Ah/sec)		Single cell fault tolerance (UL2580 sec43) GTR 20