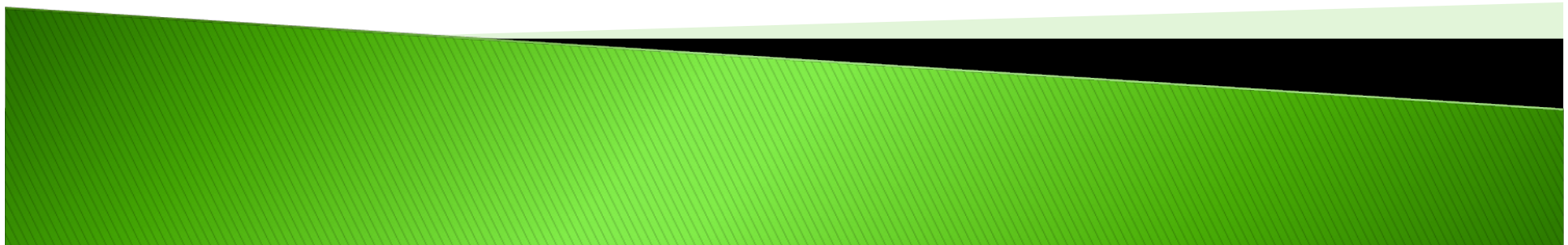




Ian Goodman
Managing Director
LiFeBATT Ltd

BMS: Does one size fit all?

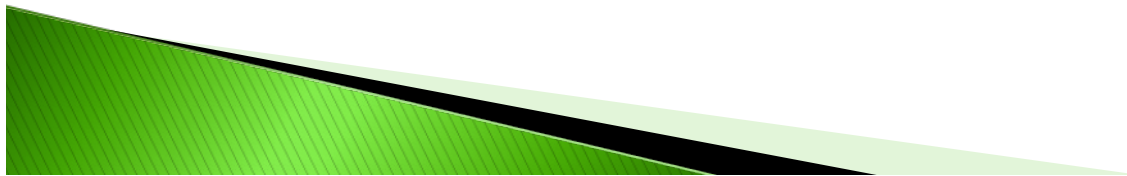
A discussion of BMS requirements for Lithium based cells.





Agenda

- ▶ Company Profile
- ▶ BMS Introduction
- ▶ What are the core functions of a BMS?
- ▶ Active or Passive balancing?
- ▶ Battery Vehicle Interface.
- ▶ Vehicle ECU Battery Integration.
- ▶ Conclusions





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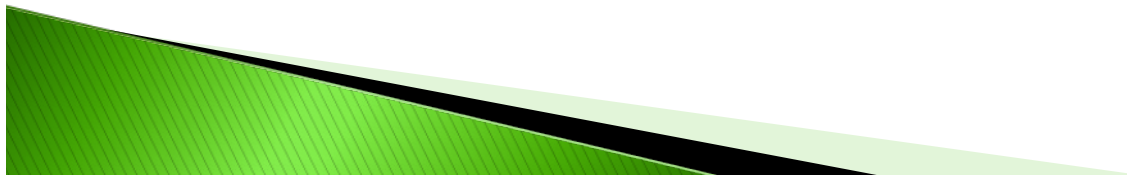
- ▶ Complete Battery System Supplier
- ▶ Partnership with LiFeTech Energy / Panjit Group Plc – Taiwan.
- ▶ BMS and Vehicle Integration R & D Centre.
- ▶ Sales & Distribution for Europe
- ▶ ISO9001 Certification 5th March 2010.
- ▶ Over 20 years experience of Electric Vehicle and automotive applications.
- ▶ Customers: MIRA (Limo Green JLR), MicroCab, Ashwoods Automotive LCVPP & Robert Bosch.
- ▶ 1.6 Million Km of product testing in last 12 months.





BMS Introduction

- ▶ Battery Management is the single biggest challenge facing the Electric Vehicle (EV) and Hybrid Electric Vehicle (HEV) market as it affects all aspects of vehicle performance.
- ▶ All Lithium based cells require the same basic management.
- ▶ All vehicles have similar safety requirements, because they are all operate by US !

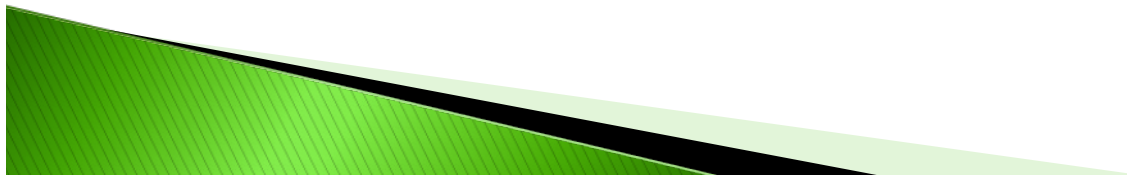




What are the core functions of a BMS?

- ▶ Cell Level
 - Cell Voltage Monitoring
 - Cell Temperature Monitoring
 - Cell Balancing

- ▶ Pack Level
 - State of Charge
 - State of Health
 - Operating parameters





Active or Passive balancing?

▶ Passive Balancing

- During charging, excess current is bypassed through balancing resistors and the discharged energy is dissipated as heat.

▶ Active Balancing

- Direct transfer of excess energy from a fully charged cell to a less charged cell.

Most Efficient ?

Most Cost Effective ?

Technology Tipping Point?

Active

Passive

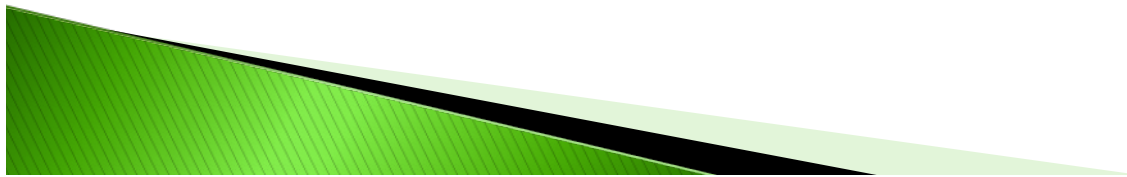
60+Ah cell (single serial string).





Battery Vehicle Interface

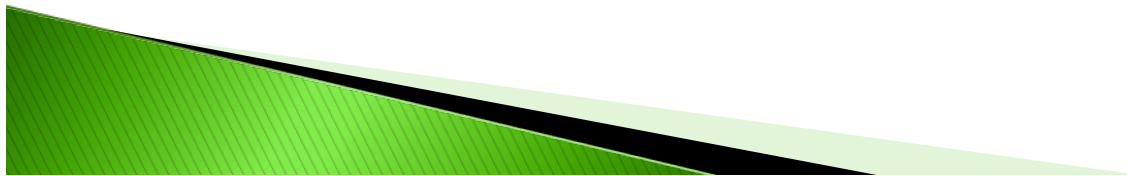
- ▶ CANbus 2.0B (or J1939), but what data is required and why?
- ▶ Driver Information
 - State of charge
 - State of health
- ▶ Drive Train Information
 - Max & Min Voltage
 - Max Regen and Discharge Currents
 - Battery Temperature





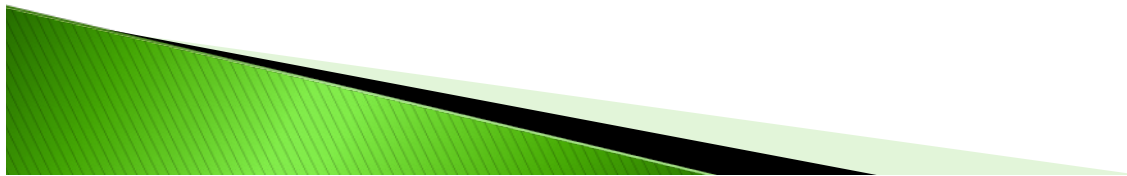
Vehicle ECU Battery Integration

- ▶ What decisions will the ECU have to make?
 - Safety protocols, ignition inhibit?
 - Earth Leakage
 - AC Supply Connected for Charging
 - Contactor Weld Detect
 - High Pedal Inhibit
 - Emergency Stop
 - Power management based on SoC, SoH and Battery Temp



Conclusions

- ▶ Can one BMS fit all?
 - One BMS strategy can!
 - But you may need different hardware to cope with different chemistries.





Thank You

Ian Goodman

www.lifebatt.co.uk

