

WILLIAMS | ADVANCED
ENGINEERING

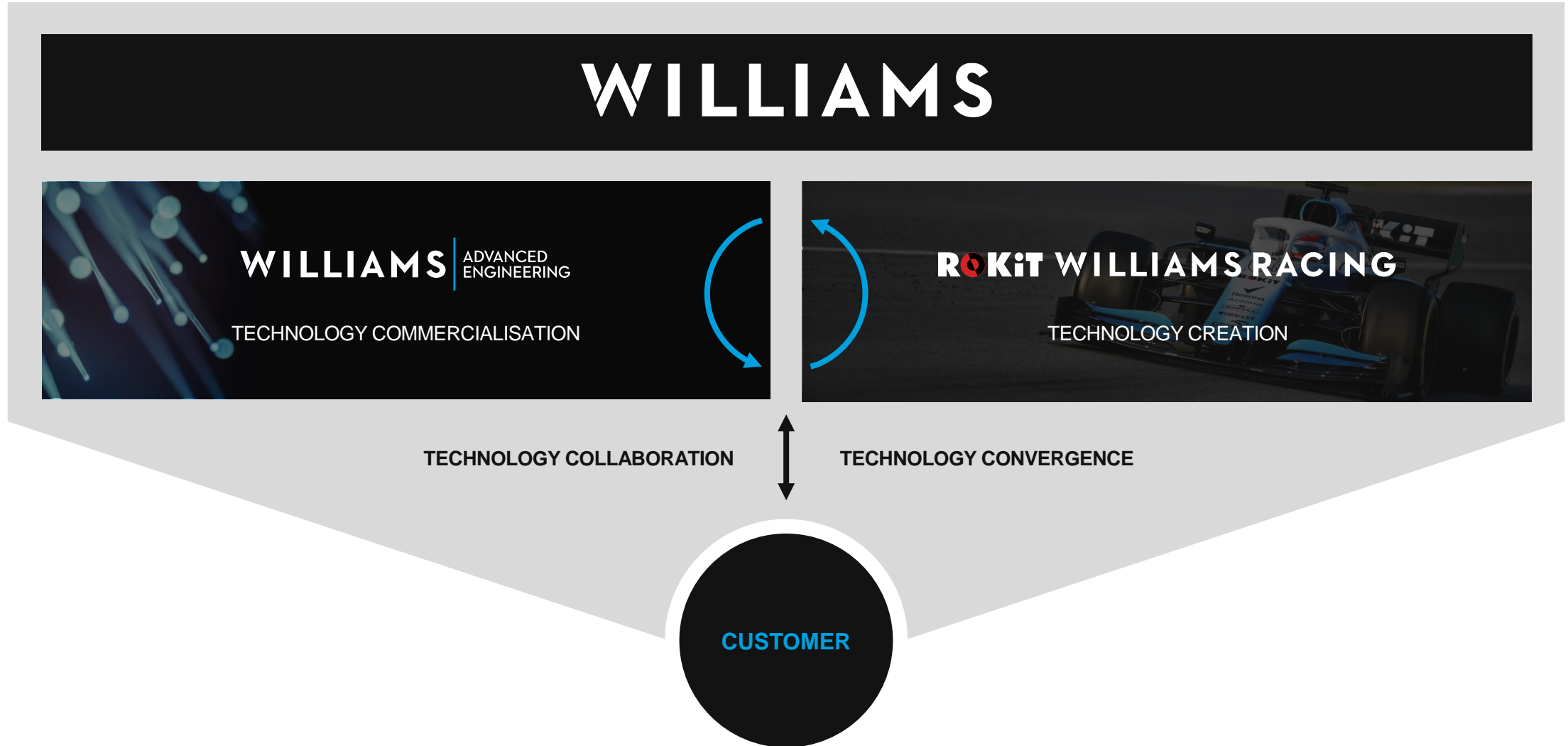
MEETING THE BATTERY CHALLENGE

ROB MILLAR

HEAD OF ELECTRICAL / BATTERY SYSTEMS

16 OCTOBER 2019

TECHNOLOGY TRANSFER & COMMERCIALISATION



SYSTEM PROVISION THROUGH TO COMPLETE TECHNOLOGY SOLUTION

ENERGY
EFFICIENT
PERFORMANCE

WILLIAMS

LIGHTWEIGHT MATERIALS TECHNOLOGY

Carbon composites, metal alloys, intelligent combinations of functionality, not just within low volume 'niche' applications, but also within high volume manufacture

HIGH PERFORMANCE HYBRID & EV PROPULSION

High specific power output engines, high torque density motors, high power density energy storage

FORMULA ONE BRED AERODYNAMICS

Positive down force, low drag, active solutions

HIGH PERFORMANCE DRIVING DYNAMICS

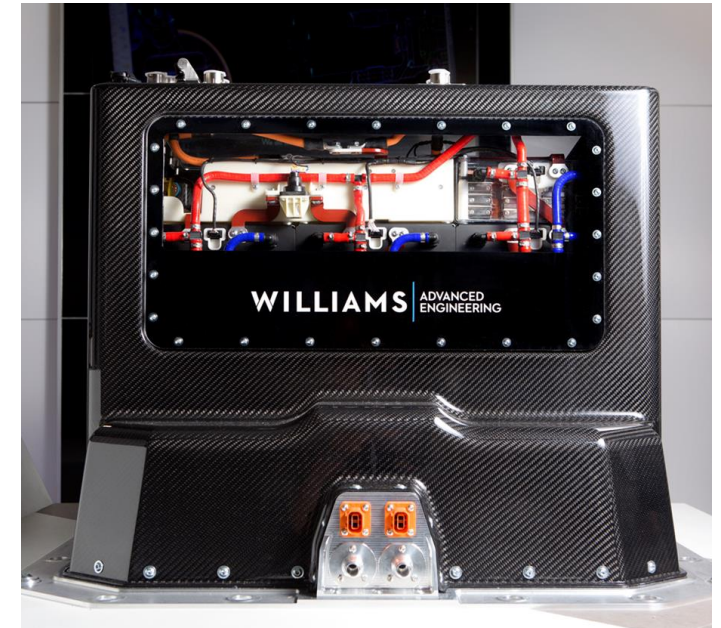
Concept creation, active and passive systems optimisation, application specific dynamic solutions

SPECIALIST LOW VOLUME OPERATIONS

Procure and manufacture high performance products in numbers from one to low thousands

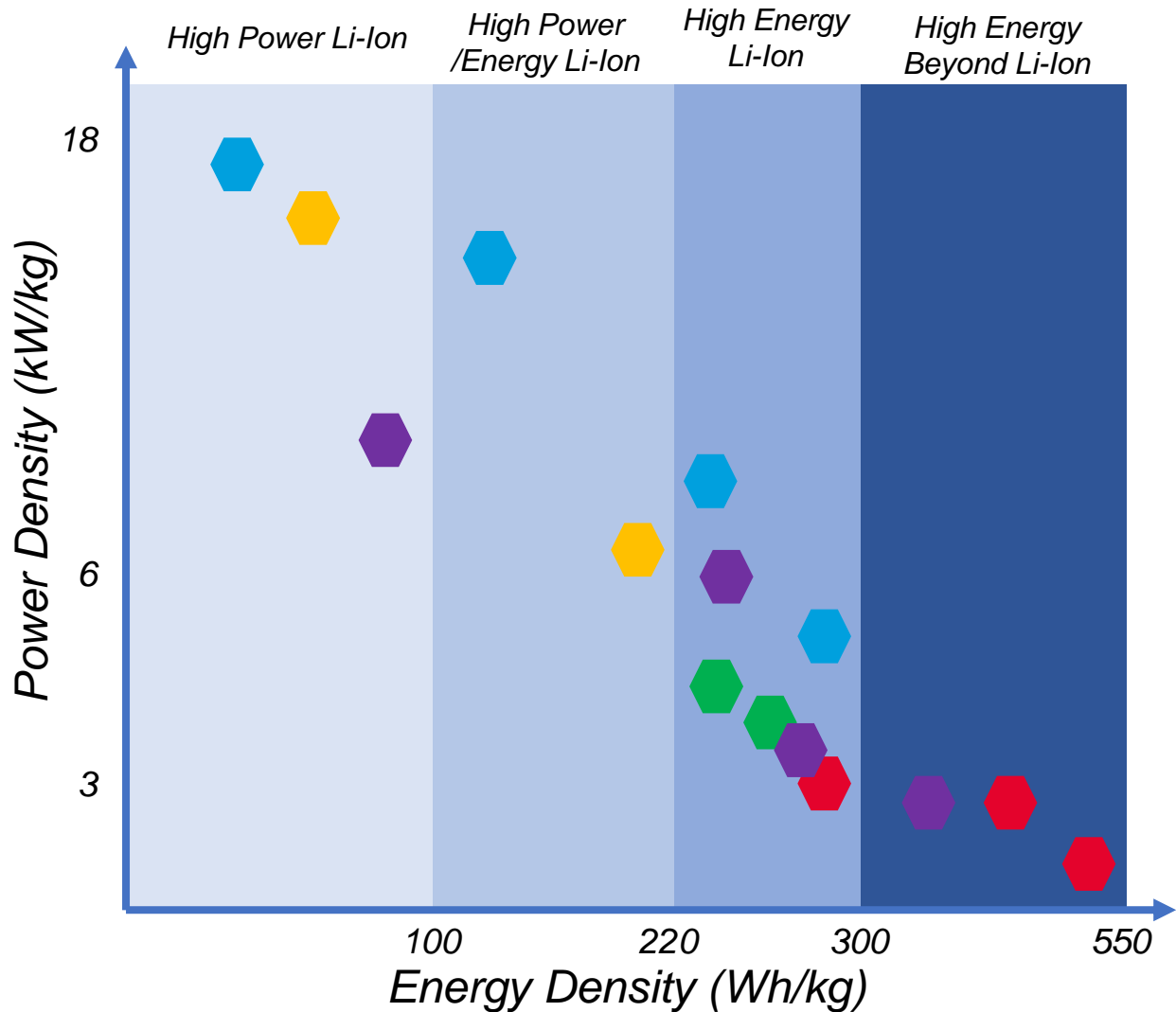
OUR ROLE – CELL TO PACK

- Screen commercially available cells
- Create module designs capable of delivering energy and power for the application
- Deliver whole battery pack solutions





Leading Li-Ion Technology



Project Description:

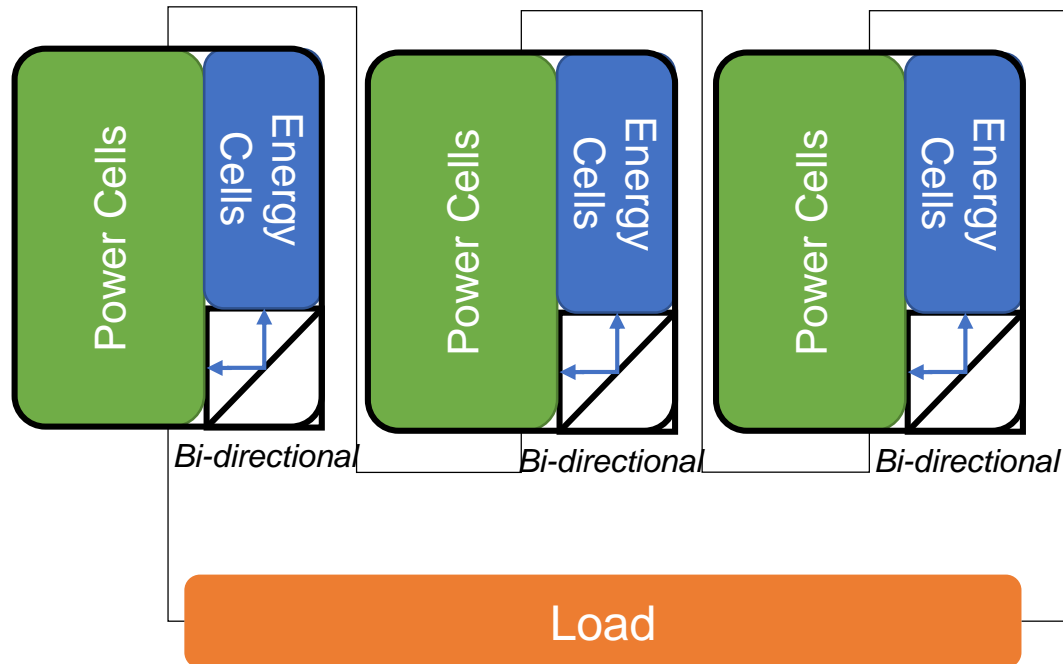
- Motorsport ⬢
- Automotive (High-Performance BEV) ⬢
- Automotive (High-Performance PHEV) ⬢
- Aerospace – Novel Cell Chemistries ⬢
- Specialist Products ⬢

Significant technology diversity within product portfolio

OUR CHOSEN SOLUTION

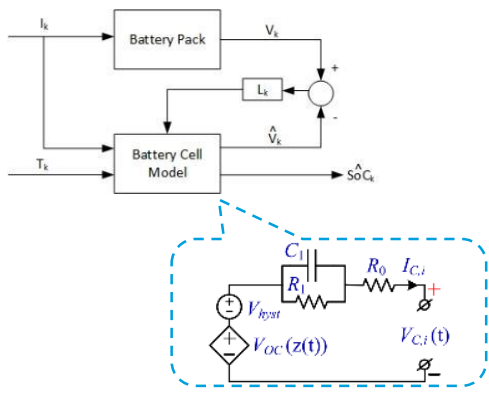
WIZER

- High Power
- High Energy
- High cell/module conversion ratio



State-of-the-art State Detection

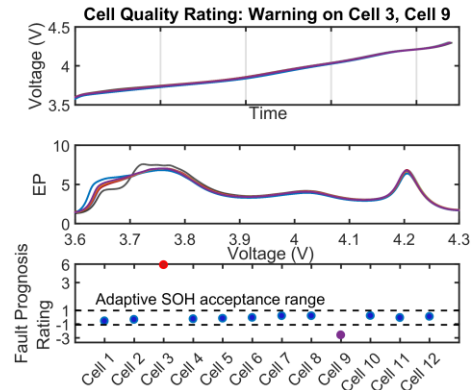
State of Charge



Increased energy availability

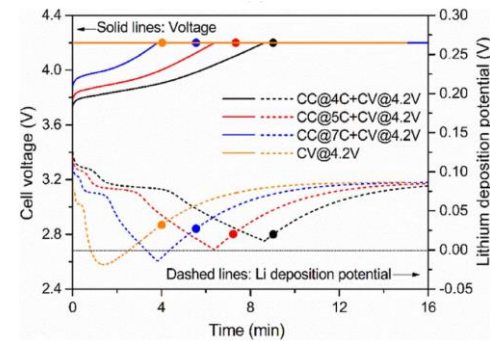
True SoC based balancing rather than voltage, resulting in increased useable energy and power over life

System Diagnostics



Leading cell quality & health diagnostics resulting in improved reliability through earlier detection of potential issues.

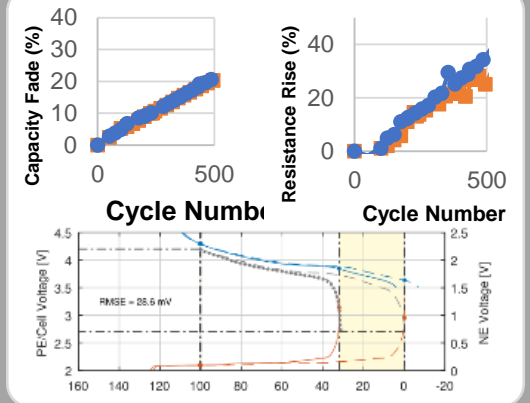
Fast Charge



Maximising charge potential of the battery system through anode overpotential estimation within a model predictive control environment.

Improved safety and reliability

State of Health



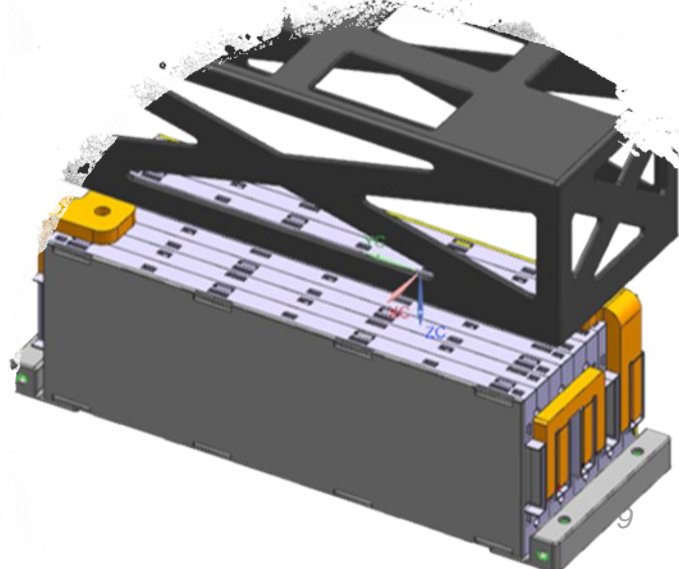
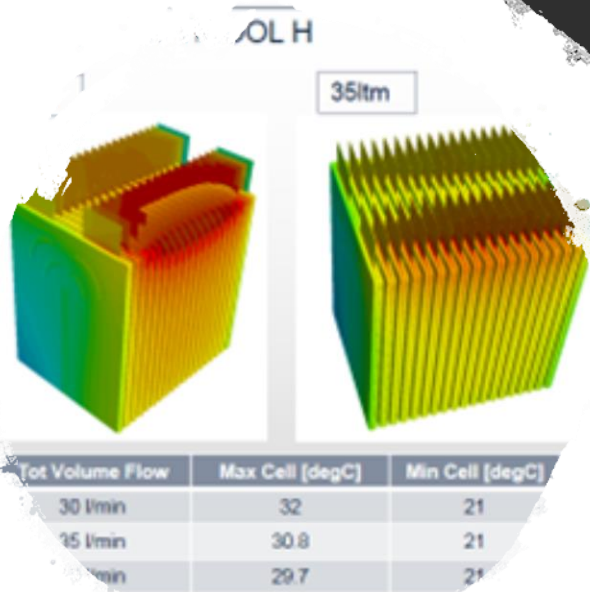
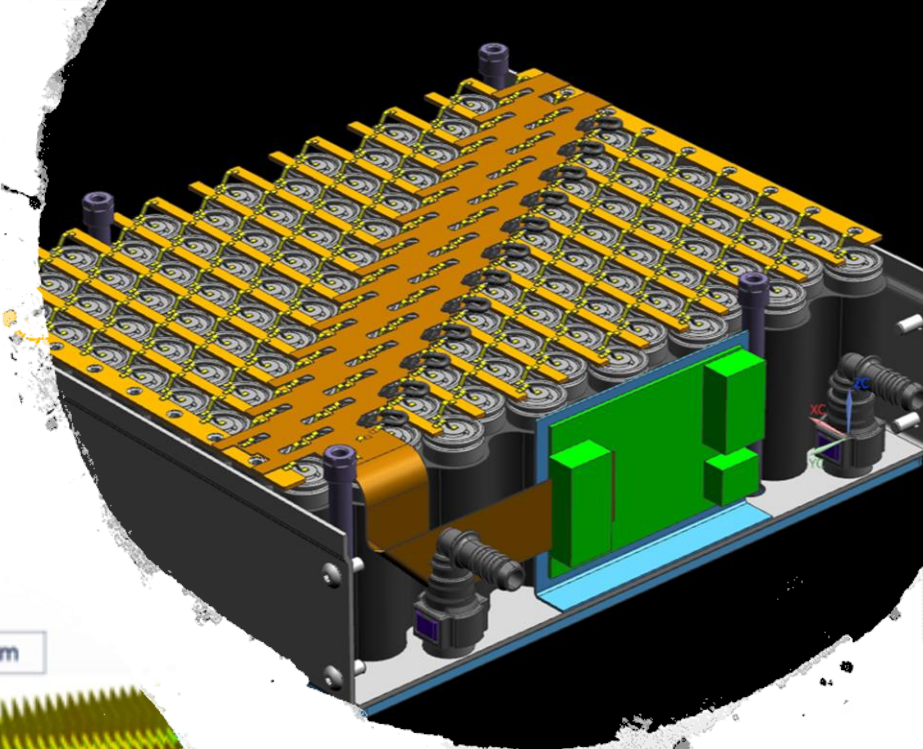
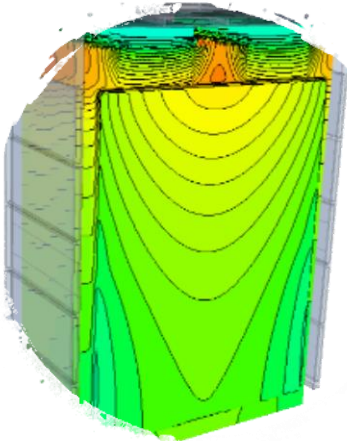
Redefining state-of-health

Transitioning away from empirical to physically informed parameters

Enables high-fidelity lifetime prognostics

MECHANICAL

- Optimised thermal performance
- Minimised weight and volume in cell/module and module/pack transitions
- New materials
- Innovative techniques





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THANK YOU

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