AIC Applied Intellectual Capital
Ventures in Sustainable Technology

‘Mind the Gap’

Enabling Technologies for Low Carbon Transport

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HETHEL ENGINEERING CENTRE

HEC-VENTURES

Introduction

- My name is Ian McDonald Chief Engineer - AIC labs Europe Ltd and M.D of S.E Technologies based at Hethel engineering centre in Norfolk.
- Collaborative member of the HEC-Ventures low carbon vehicle consortium.
- Formerly Chief Engineer – Lotus Engineering 1998-2007.
- Automotive engineering background since 1977 including PSV's, Formula 1, Luxury sports, EV and Hybrids.

The Pivco Years

- In 1997 Lotus asked me to go to Norway for 2 days

Image source TH!NK Nordic

The PIVCO - TH!NK

- Battery pack was Nickel-Cadmium weighing in at around 500Kg and containing 11.5 kWh of energy. The motor is a liquid cooled 3-phase AC induction motor.

- Top speed was 70mph with a range of around 50 mile

- A car built around a battery

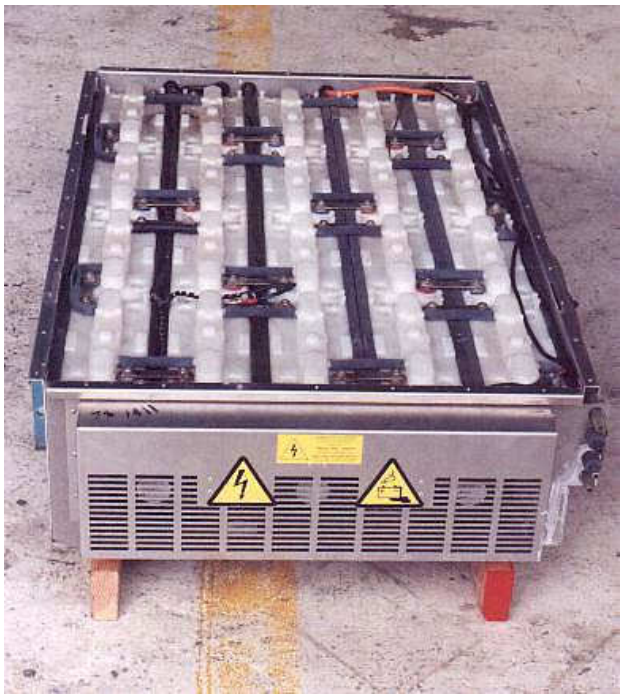
The Battery Pack

Self contained in a steel box

SAFT Nickel Cadmium shown right

In 2004 it was announced that Zebra would supply new power packs (Sodium Nickel Chloride)

In June 2008 a Li-ion battery was installed in a demonstrator vehicle in the U.S



In 2009, the TH!NK website advertises no less than 3 battery options

Moving Goal Posts

- ‘Battery energy density doubles every 5-7 years’
- ‘A Battery takes around 5 years to thoroughly test’
- A new car takes around 5 years to introduce
- Manufacturers have to put a stake in the ground
- The majority of EV companies are SME’s
  - Small volumes
  - Separate Chassis
  - Composite structures

EV Technology Gaps

Battery and vehicle cost

Range perception

Length of re-charge

Image

Safety

Enablers

- Reduction in battery size and cost

Average commuting per day in the UK is about 18 miles at an average speed of 18mph for 1 hour

Image source - Tesla cars media dept

Smaller Packs a Punch

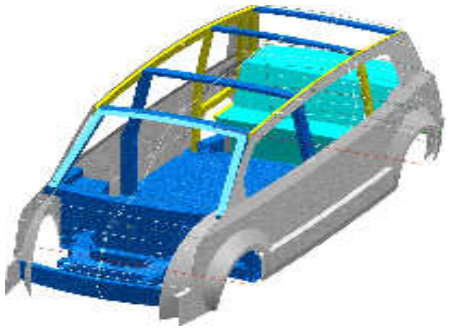
Range Extenders

- Various initiatives both sides of the Atlantic
- US Money likely to be spent in U.S
- A recent European concept car had a 30mile range on battery, with a 140PS range extender – why?
- A 30kw range extender can maintain 60mph
- HEC-Ventures are currently engaged in the design of a scalable, ultra-efficient two stroke bio-fuel range extender unit specifically for automotive us.

  (patents app for)

Adaptable EV Platform

- Mainstream manufacturers reduce costs through shared platforms
- HEC-Ventures and Automotive Design Partnership ADP are part of the E-CAB consortium
- Develop a flexible composite shared platform
- Elementary modules carried over between models
- Designed to accept HEC-V range extender



EV ~~Gaps~~ Enablers

Battery and vehicle initial vehicle cost

Reduce battery mass and volume, reduce cost

Range perception

Range extension using bio fuel derived I/C

Length of re-charge

Reduce the size of the battery, reduce charge time, efficiency

Image

Composite vehicles, beautify transport – adaptable lightweight

Safety

Batteries away from the crash zone, structural integrity, fit for purpose

Thank you

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