

## **>> ALL-ENERGY'08**

### **Supply Chain Issues**

The transfer of high reliability electronic solutions across market sectors

Thursday 22<sup>th</sup> May 2008

Presented by

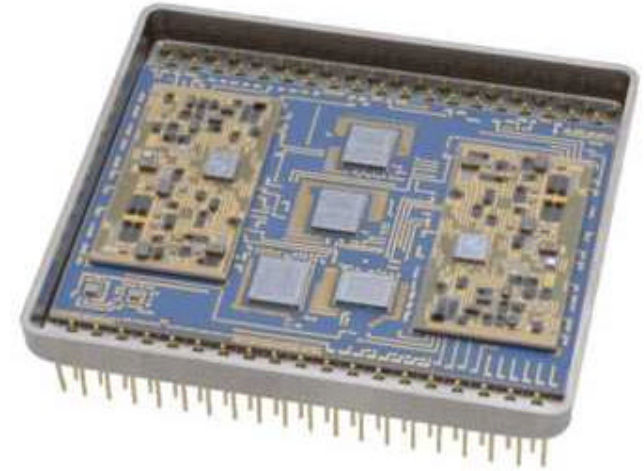
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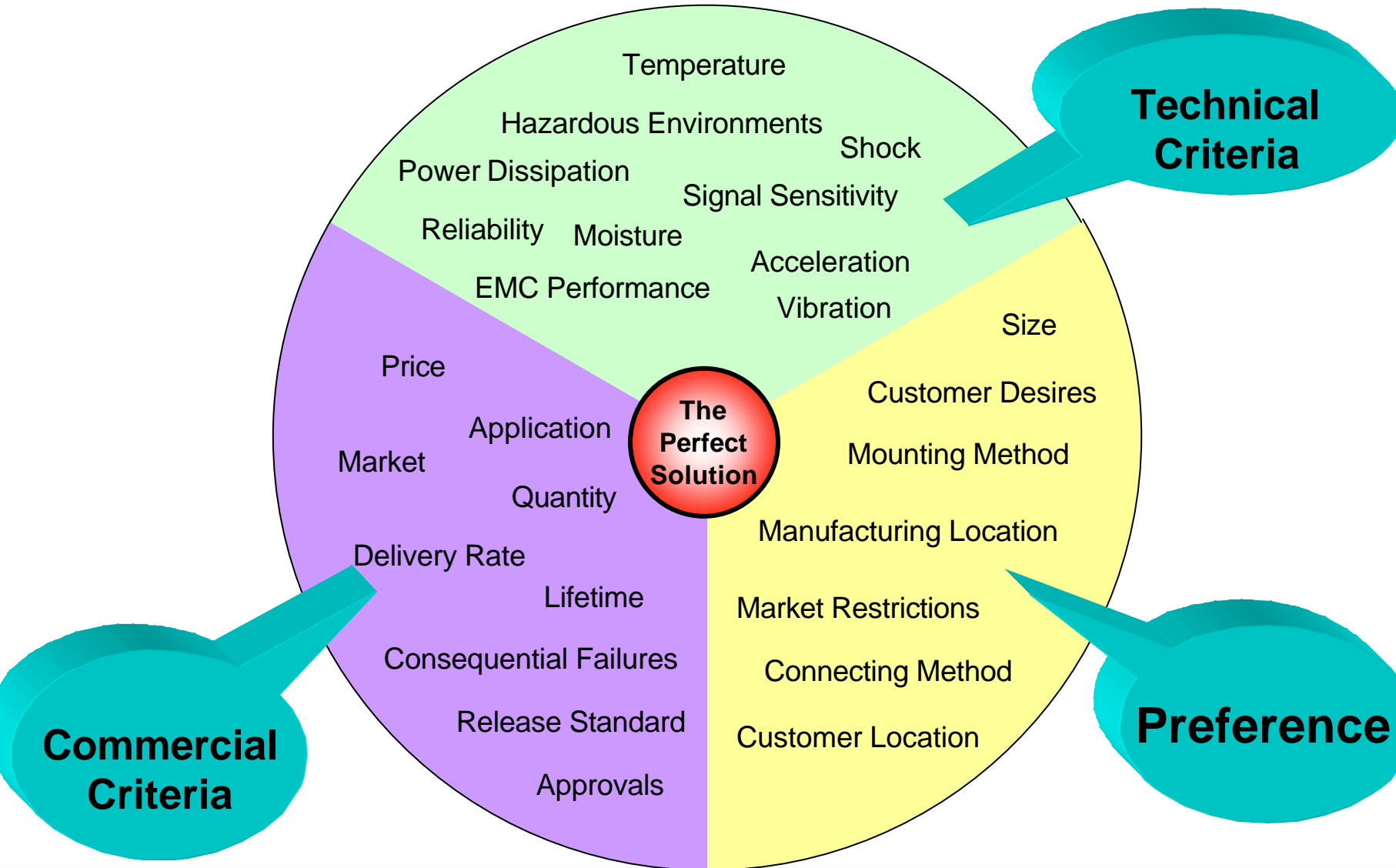
## C-MAC MicroTechnology

- Based in Great Yarmouth
  - Global supplier of electronics solutions
  - Established 60 years in design, development and manufacture
  - Pedigree with 'High Reliability' electronics in harsh environmental applications
- Experience with robust technologies that ensure long term reliable operation and addressing key challenges
- High shock and vibration
  - High temperature and low temperature
  - High pressure
  - Resistance to chemical corrosion – Saline solutions, acids, oils etc
- Products and services - qualified and proven in the field

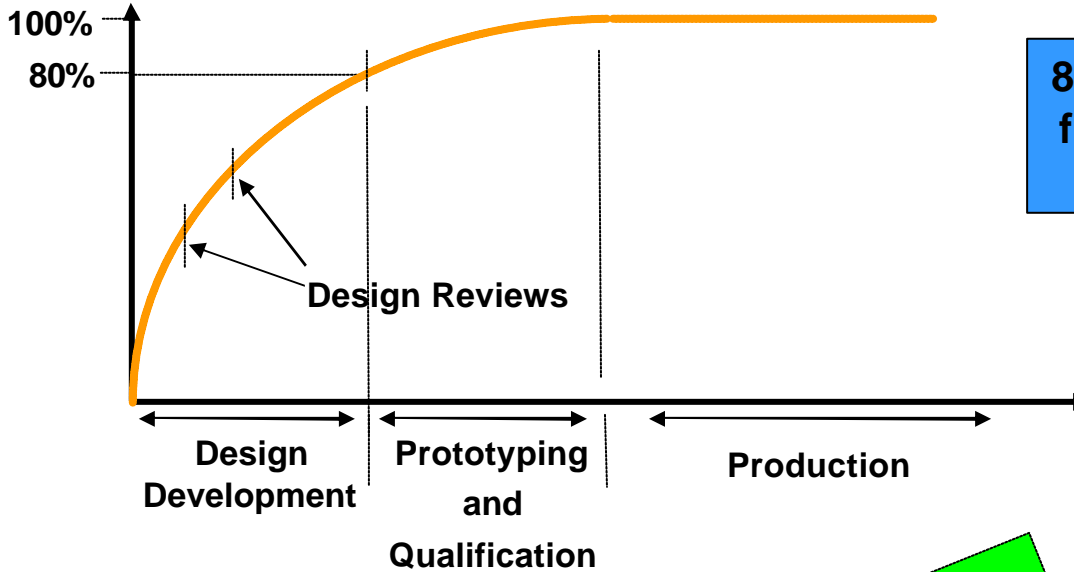


- Across all market sectors since year 2000, there has been massive migration of electronics manufacture to Asia
- OEM (Original Equipment Manufacturer) companies have outsourced electronics manufacture and also 'routine' engineering design to CEM (Contract Electronic Manufacturer)
- The UK retains specialist engineering strength within its electronic manufacturing base
  - Close to system developers
  - Accelerating 'Time To Market'
  - Addressing fundamental applications requirements
  - Providing true 'Fit For Purpose' products

- The Energy Sector has very similar demand on electronics as the established High Reliability market sectors: Aerospace, Automotive and Medical
  - Harsh environments
  - High quality / reliability
  - Longevity
  - Safety critical
- The applications of electronics in the Energy sector covers many facets
  - Exploration
  - Recovery and conversion
  - Distribution
  - Storage
- Within this evolving industry there are limited established solutions or supply chains that fully satisfy the needs



## COST



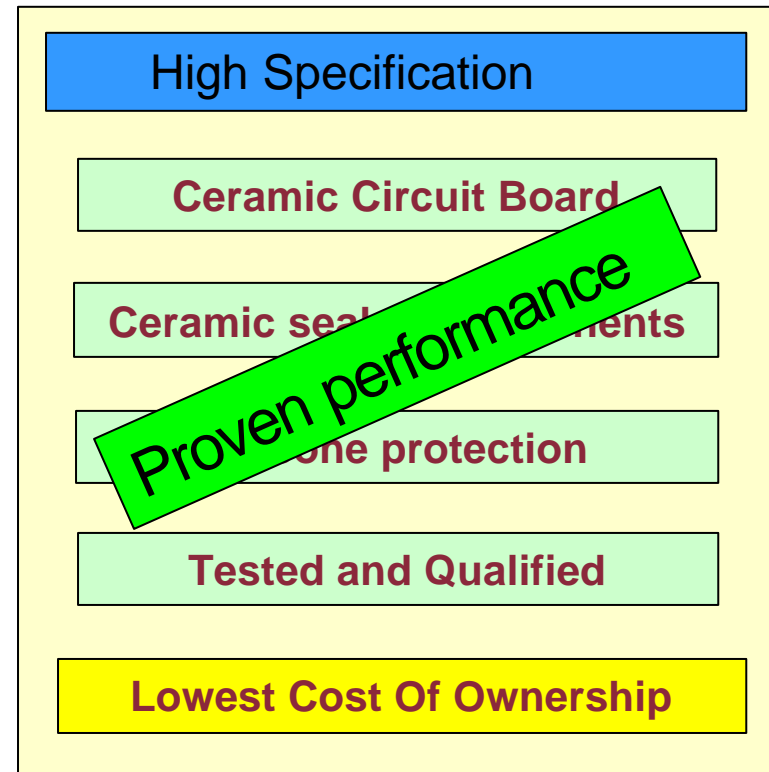
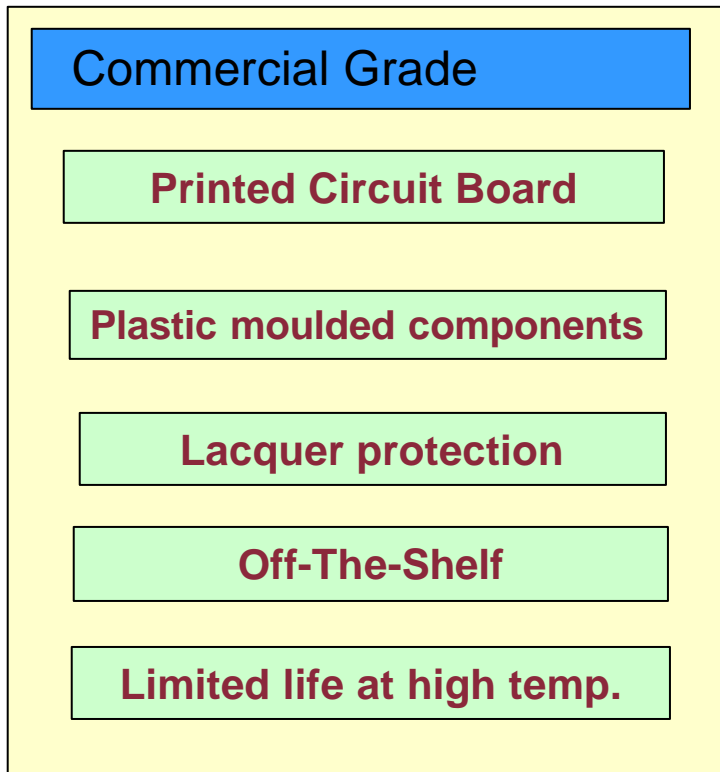
80% of product cost is fixed during Design & Development

## TIME

- Design 're-use' across markets seen to increase value
- Development costs significantly reduced
- 'Time to market' significantly reduced
- Final product cost is known – inherent within the design

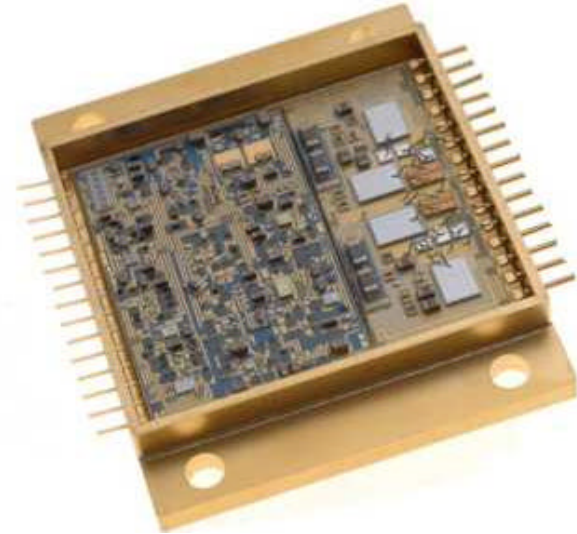
**Avoid re-inventing the wheel**

- Most of the electronics utilised in the Energy sector is 'off-the-shelf' commercial grade electronics
- Specifications for systems do not necessarily reflect the requirements



Modular electronics are widely accepted in established markets

- **Elimination of unnecessary packaging**
- **Lower cost**
- **Flexibility**
- **Reliability**
- **Plug-and-play functionality**
- **Programmability and upgradeability**

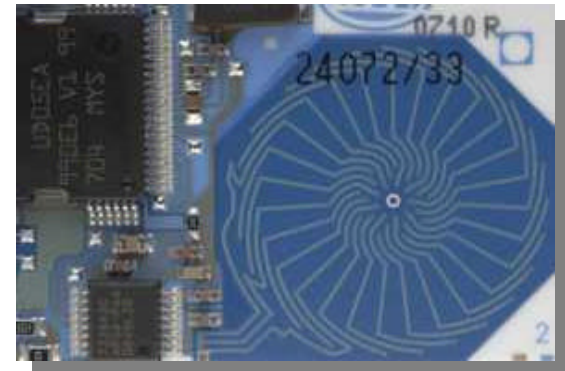


## ➤ Aerospace

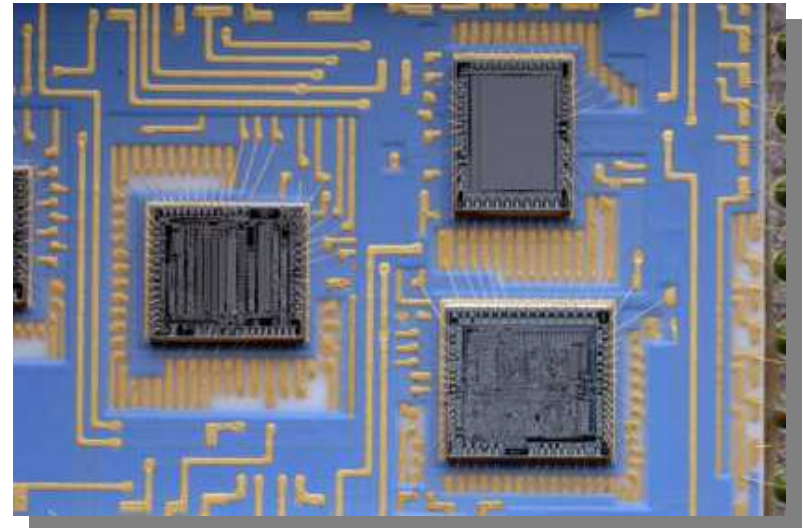
- Proven/known reliability
- Customised products
- Extreme environments
- Safety critical
- Wide temperature

## ➤ Automotive

- Zero Defect targets
- Engine mounted
- High volume
- Global supply chain
- Standardisation

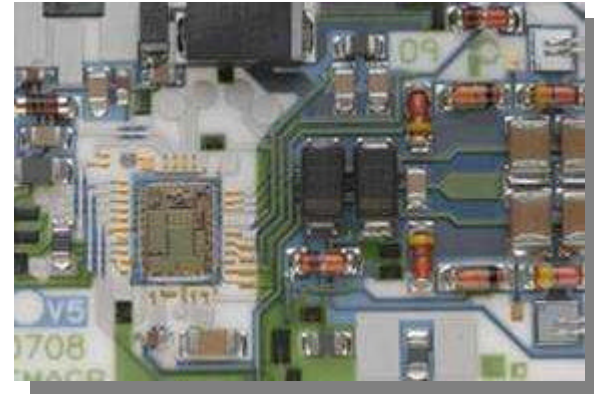


- Sub-sea cable: Amplifiers (Repeaters) – electrical and optical
- Aircraft: Fuel pump motor controllers
- Automotive: Exhaust Gas Recirculation Control
- Satellite: Control systems
- Nuclear Power: Control systems
- Automotive: Anti-lock braking
- Automotive: Turbocharger Controllers
- Industrial: Bearing wear monitors



# Case Study - Automotive Market Exhaust Gas Recirculation Sensor

- Implementation of a high volume, fully automated production line
  - SMT assembled hybrid
  - Hybrid mounted to heat sink
  - Gold wire bonds to ASICs
  - Mounting of hybrid into housing
  - Aluminium wire bonds to housing
  - Silicone fill and curing
  - Laser welding of cover
  - 150C Operating



**Mixed Assembly Technologies**



**EGR hybrid in housing**

- Existing electronics supply chains in established markets can provide significant value to the Energy Sector
  - Availability – Minimal down-time
  - Quality and Reliability
    - High temperature and harsh environment operation
    - In built redundancy
  - Lower ‘Cost of Ownership’
  - Support, future enhancements and upgrades
  - Longevity
  - Obsolescence management



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