

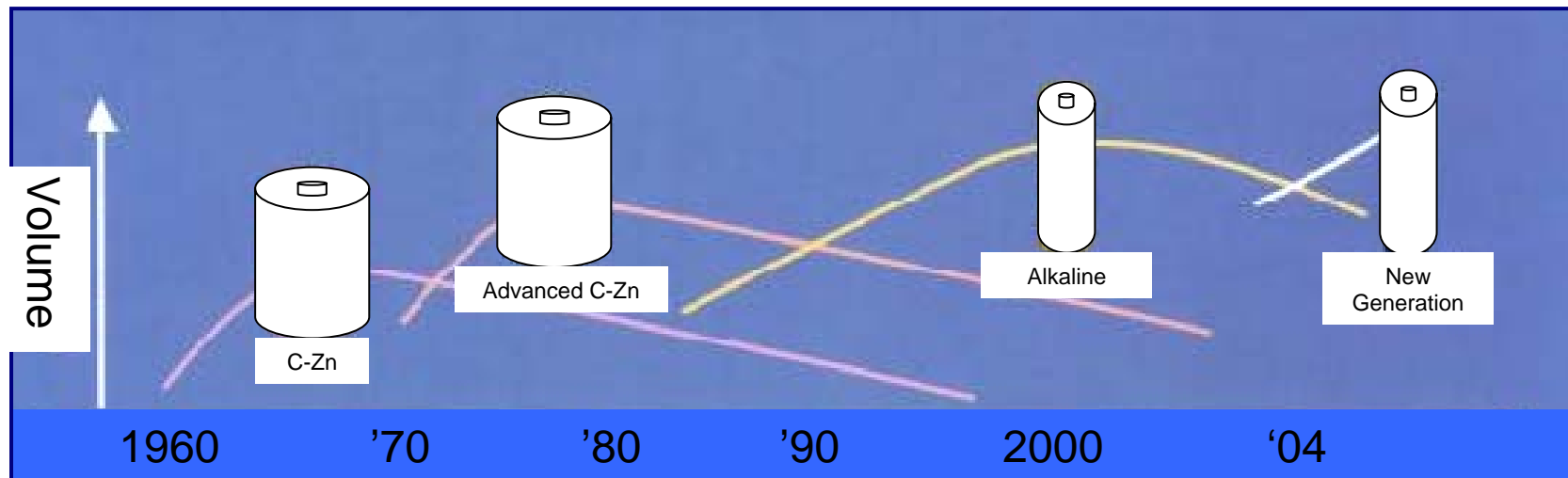


Challenges of the EMD Industry

21 May 2008
Hainan, China

Tosoh Corporation

Development of Battery Japan

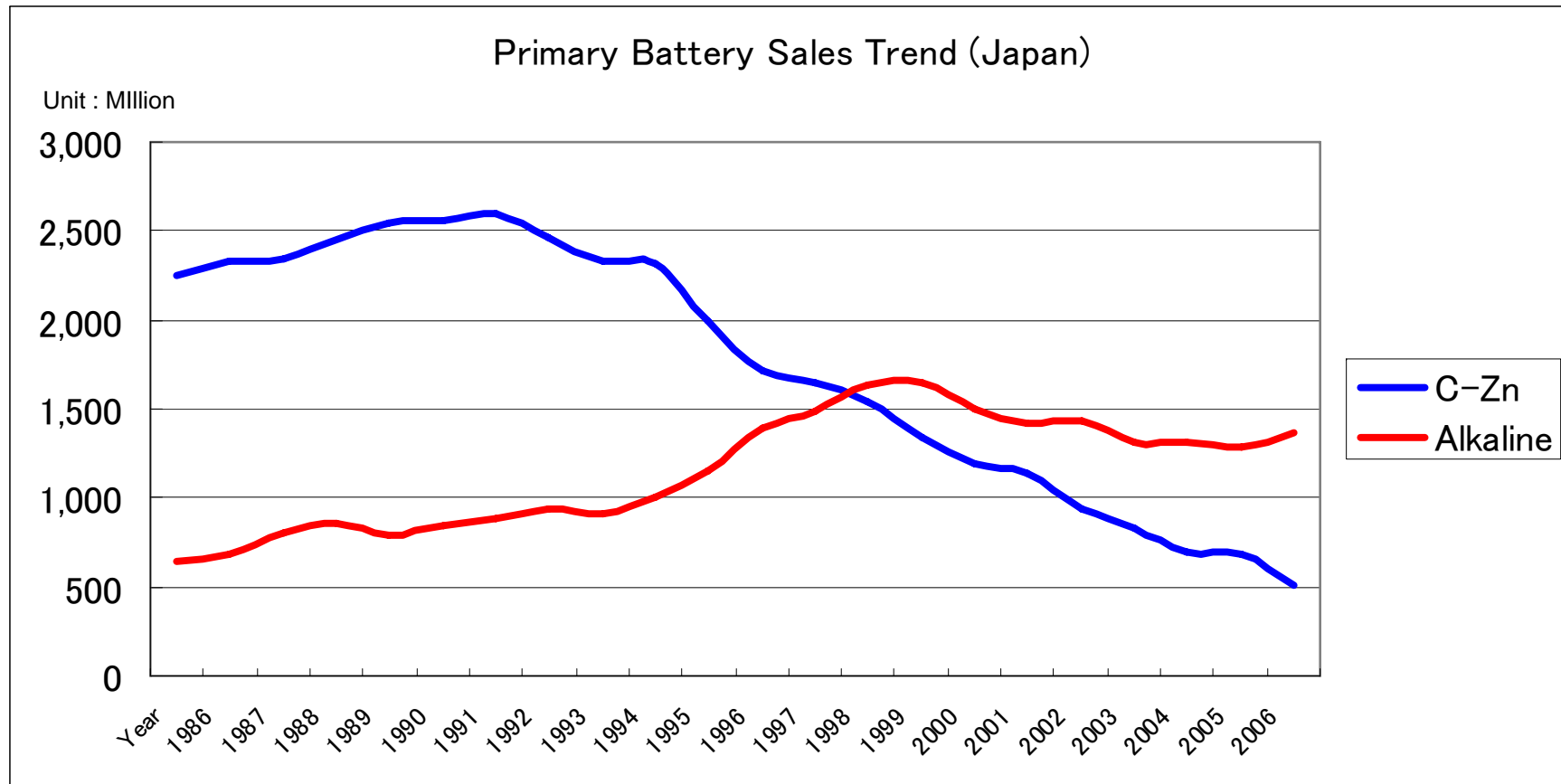




Development of Battery

- 1960 Carbon-Zinc Battery for Toys and Flashlights
- 1970 Advanced Carbon-Zinc Battery
Large capacity required for radio-cassette player
- 1980 Alkaline Battery launched into the market
Portable games, portable music players etc.
Different Market category for C-Zn and Alkaline
- 2000~ New Generation Battery

Primary Battery – Japan



New Generation Battery

Panasonic “Oxyride (2004)”

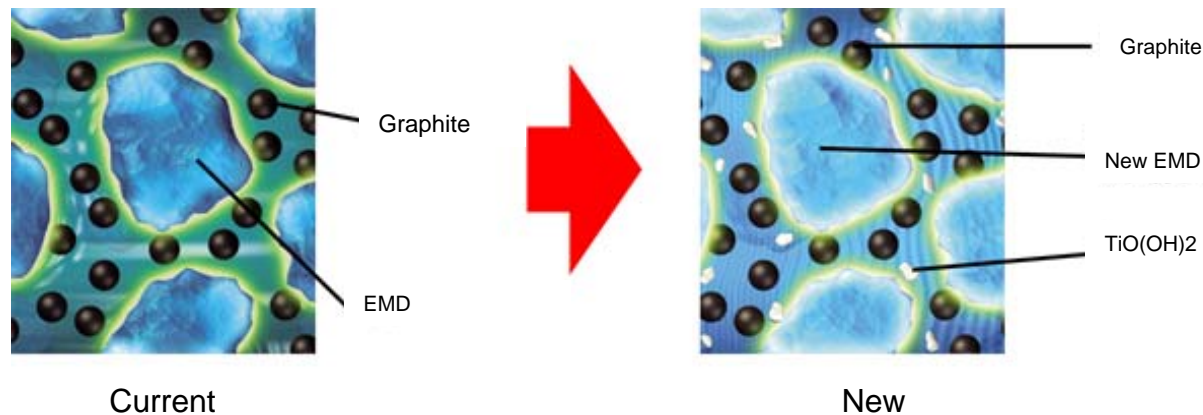
1.5 times longer life time compared to conventional alkaline battery



Panasonic “Evolta (2008)”

Longest life time, highest performance

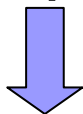
Longer shelf life : 10 years



New Generation Battery

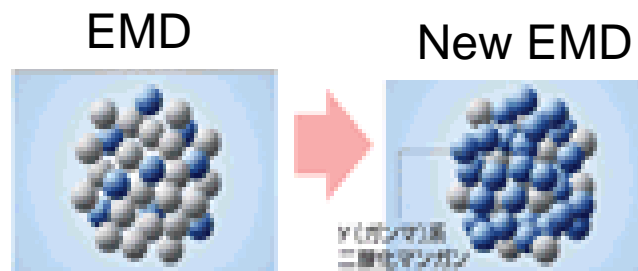
Hitachi Maxell “Epsi-Alpha (2004)”

Improved Discharge performance (70% increase compared to conventional battery)



Hitachi Maxell “Dynamic Voltage (2008)”

Further longer life time





Requirement to EMD Manufacturer

- EMD Product improvement

Property – Alkaline Potential

BET Surface Area

Performance- Utilization, Better discharge

Better processability, Handling

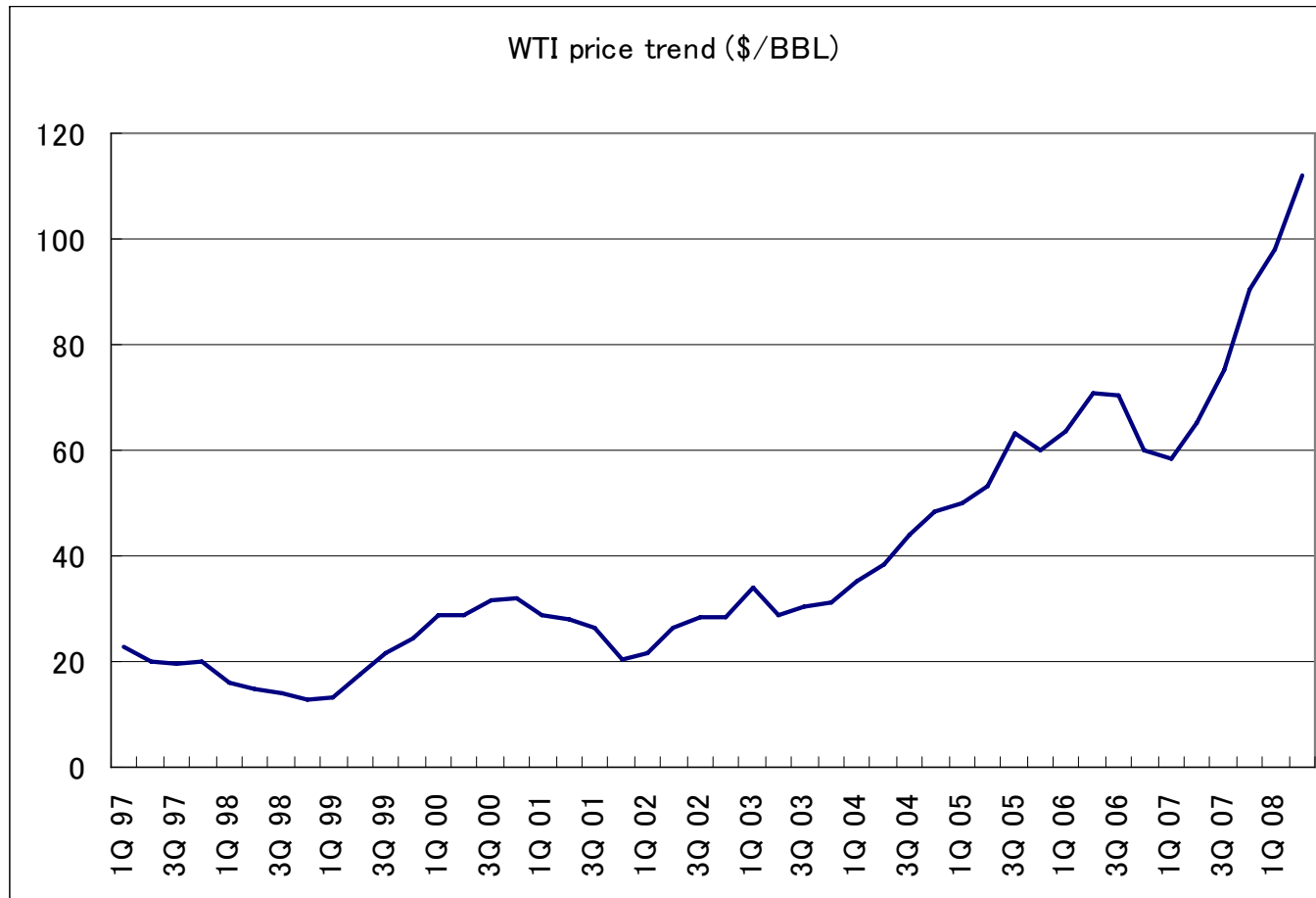
- EMD Process control technology

Tight control is required

- Technical Support

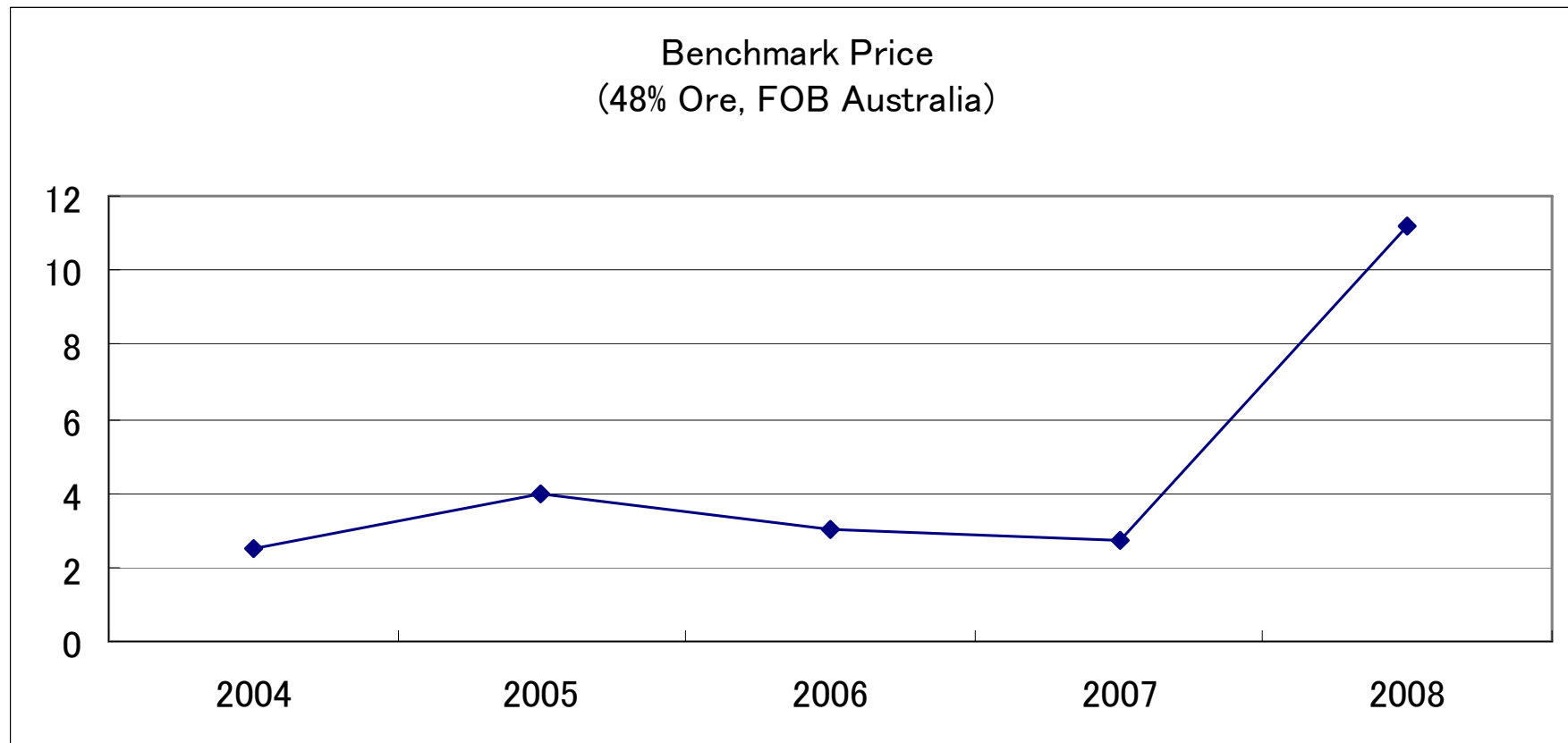
EMD Cost Increase

Energy Cost (Oil)



EMD Cost Increase

Material Cost (Mn Ore)





Summary

- EMD Manufacturers needs quality improvement to meet customer requirements.
- Cost squeeze is critical in EMD industry.