Generator Start-battery Application
Introduction to EnerSys

- Reserve Power
  - Telecommunications
  - UPS Systems
  - Utility Applications
  - Specialty Devices
  - High end Automotive

- Motive Power
  - Fork Trucks
  - Material Handling Equipment

- Aerospace and Defense
  - Airplanes
  - Submarines
  - Land Equipment
Largest Industrial Battery Company

- Headquarters in Reading, Pennsylvania USA
- Public company traded on New York Stock Exchange – “ENS”
- Annual revenue in excess of $1.5 Billion; 7000+ Employees worldwide
- Estimated 30% leading share of a $5.7 Billion market
- Manufactures and distributes industrial batteries in three markets
  - Reserve Power
  - Motive Power
  - Aerospace & Defense
- Leading worldwide presence
  - 23 manufacturing facilities globally
  - Over 10,000 customers in over 100 countries
- Broadest product portfolio in industry
Over 10,000 Customers in over 100 Countries
23 Manufacturing Facilities and 7,800 Employees
Subset of Global Customer base
Understanding the Application

- Generators purchased for catastrophic failure
- Harsh environments
- Limited maintenance and resources
- Limited start battery corporate resource focus
- Purchases based on what is locally available
Why Generators?

- Ordinary Severe Weather Outage Yearly Average
  - 39.23 hours per Year
- Ordinary Standard Outage Yearly Average
  - 4.21 hours per Year
- 8 hour outages occur every 1.18 years
- 24 hour outages occur every 2.27 years

The generator start battery is a critical path component in determining whether your network is powered during a catastrophe.
Common Generator Battery Choice Stats

Competitive Flooded Product Group 31

• Based on sample set of 3 batteries
• Cold Cranking Amps 0 deg F
  – 1st test 810 amps 39.9, 18.4 and 20.4
  – 2nd test 810 Amps 7.4, 9.1 and 30.7 seconds
• Cranking Amps 32 deg F
  – 1st test 950 Amps 25.4, 17.3 and 18.4
  – 2nd test 950 Amps dead, 17.4 and 1.4
  – Failure mode on the dead battery was a lug over the partition that failed
• 2150 PHCA 77 degrees F - <1 second hold time
• 1150 CCA 0 degrees F - <1 second hold time
Common Generator Battery Choice Stats

Competitive AGM Product Group 31
• Based on sample set of 3 batteries
• Cold Cranking Amps 0 deg F
  – 1st test 925 amps .3, 15.1 and 14
• Cranking Amps 32 deg F
  – 1st test 1110 Amps 28.1, 30.1 and 28.4
• 2150 PHCA 77 degrees F - <1 second hold time
Common Generator Battery Choice Stats

Competitive Spiral Wound Product Group 31
- Cold Cranking Amps 0 deg F
  - 900 amps
- Cranking Amps 32 deg F
  - 1125 amps
- Cranking Amps -4 deg F
  - 810 amps

» Published rates
Odyssey – Not the average start battery

- Cold Cranking Amps 0 deg F
  - 1st test 1150 amps 30 seconds
- Cranking Amps 32 deg F
  - 1st test 1370 Amps 30 seconds
- Starting Power -4 deg F
  - 1082 amps
- 2150 PHCA 77 degrees F - <1 second hold time
- Extreme Temperature tolerance
  - -40C (-40F) to 80C (176F)
- 4 Year Warranty
Where does the power come from?

- Battery power is a function of lead plate surface area
- Odyssey Batteries have more plates because of the thin plate pure lead technology
- Terminals are designed to optimally pull as much energy as possible; at the time of need.
  - Thicker posts with Brass inserts
What about the life?

- Battery life is supported by a combination of materials, design and environment
- Odyssey has a float current of approximately 50% less than PbCa
- Shelf life of 3 times that of PbCa
- Lower rate of Corrosion
- Lower gassing rate

Why: Pure Lead Grids, High purity materials, automated manufacturing and high quality and proven design.

**Thin Plate Pure Lead Positive**
The very fine grain structure makes the grid far more resistant to corrosion

**Pb-Ca Alloy Positive**
Grain boundaries lead to Grid corrosion, Grid Growth and Loss of capacity

**Minimun head space**
(explosion resistant)

**Welded over wall connectors**
(no internal sparking)
(uniform cross sectional area)

**92% saturated separator**
(Drycell™ - non-spillable)

**Direct cast terminal w/ mechanical compressed terminal seal**
(no leakage terminals)

**Untapped power - Shrt Cir**
(high cranking voltage)
Proof of Power is in the Testing

Comparison at CCA Ratings

Odyssey Low Temperature Performance
Proof of Life and Field Service

Los Angeles Fire and Ambulance

Pennsylvania State Police

Los Angeles City Transit

Seattle Fire and Ambulance

Seattle King County Metro

US Government M1 Tank
What good is the generator if it doesn’t start?