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POWER & COMMUNICATIONS

# **Got Warranty?**

## **Taking Another Look at the 20-Year Battery Warranty**

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# Why?

- Still a major source of confusion for our customers
- Still a fundamental disconnect between user **expectations** and the **reality** of actual battery performance & life
- Exacerbated by huge growth over past 15 years of installed base of lead acid (VRLA) batteries
- Proliferation of new customers & applications with increased scrutiny of industry practice

# Objectives

- Review origins & history of 20-year warranties, and original assumptions; relationship between design life, service life, and warranty
- Overview main issues & problems with current practice, represent views of all parties
- Suggest a process for exploring alternatives to the current warranty practice; develop warranties that more accurately reflect actual performance & life

# Origins of the 20-Year Warranty

- Developed to promote emerging lead-calcium designs (1950's, early 60's)
- Industrial stationary battery markets then dominated by traditional high-antimonial & lead Plante battery designs (Manchex)
- While each design type had Pro/Con's, one thing was clear:

**Life expectancy averaged 18-25 years**

# Marketing Challenge

- Lead calcium advocates felt they offered a better solution:
  - Improved watering maintenance profile vs. high antimonial lead designs
  - Improved economics, reduced footprint & size, broader size range vs. Plante designs
  - Approval by Bell Labs in 1951

**BUT...**

- Faced significant resistance from traditional users, including telecom, utility, & switchgear (High antimony & Plante batteries had generally performed well)
- Needed to offer users assurance that design was comparable; sales & marketing needed a tool to help promote lead calcium batteries

# Technical Challenge

- Lead calcium manufacturers had limited empiric field data to support life expectancy claims
- Realized that more accelerated life testing was needed to characterize performance & life expectancy of lead calcium design

# The Beginning

- Eugene Willihganz (circa 1964-1966)
- Developed process & procedures to more accurately accelerate battery aging; built on work of Thomas & Haring
- Long-term research project w/ 500 cells
  - Ovens set at 5 temperature levels (100°F -160°F)
  - Range of float voltages (2.10V – 2.50V)
- After 2 years of testing, presented paper & report w/ strong conclusion – 20 year life for lead calcium design

# Original 20 Year Warranty

- Circa 1968 – 1/19 Warranty Program
  - Based on manufacturer assumptions for life cycle and replacement costs
  - Caveats for record-keeping, required environmental conditions, maintenance
  - Caveats not fully understood by customers (general good performance of flooded batteries prevented this from being an issue)
- Marketing success – industry soon followed



# VRLA – The Plot Thickens

- Commercial intro of VRLA (1978) complicates the issue
  - Pioneered by Sonneschein, commercialized by Gates, Gould Industrial Battery
  - Revolutionary approach to the design, packaging, & construction of lead acid batteries
  - Originally developed for cycling motive applications; aimed at significant reduction of maintenance, footprint
  - Explored opportunities with stationary customers

UNPREPARED FOR HUGE MARKET RESPONSE

# Why Not?

## Value Proposition:

- VRLA offered significantly reduced size & weight, higher power density
- Promise of elimination of watering & maintenance (internal recombination design)
- Dramatic increase in potential applications (e.g. telecom: outside plant-subscriber-loop)
- Potential for superior economics (product cost, installation, maintenance)

# Early Issues

- Relative lack of empiric life data
- Proponents made a number of assumptions: thick plate design, proper recombination, little or no water loss- solid life & performance
- 20 –Year warranties had become an industry standard – customers wanted guarantees
- VRLA manfgr’s faced pressure from sales & marketing groups to solidify customer acceptance
- Believed VRLA would replace flooded designs

HIGH EXPECTATIONS

# The Gap: Expectations vs Reality

Widespread problems within first 5 years (many not fully understood at the time)

- Voltage imbalances: undercharging/depressing of negative (gas recombination) – loss of capacity
- Internal VRLA pressure - nuances of valve design not understood
- Outgassing & dry-out
- Plate growth & bulging
- Jar cover seals
- Plate separation

# Why?

- Teething problems of a new technology
- Life expectancy assumptions:
  - Lack of proper procedures/equipment to conduct comprehensive accelerated tests
  - Procedures developed by Willihnganz for lead calcium flooded batteries were designed for positive plate corrosion & growth – traditional determinants for flooded life
  - Had little correlation to the actual service life of VRLA & field problems encountered
  - Scarcity of hard laboratory & field data

“We just didn’t know then what we didn’t know.”

# Growing Conflict

- Manufacturers faced with large exposure
  - Financial pressure
  - Warranty language saddled with increased caveats, exceptions, responsibilities on users
  - Temperature compensated battery chargers
- Users force to re-examine economic assumptions, operational processes, & maintenance/replacement
  - Unpleasantly surprised by actual terms of warranties regarding what was/was not covered
  - System failures, failed batteries, replacement installation cost

**Strained relationships between manufacturers & users**

# Where Are We Today?

- Confusion & inconsistency hurts our industry
- The questions should be simple:
  - Who is responsible for what?
  - Who pays how much?
- VRLA a victim of the original high expectations
  - Failure to recognize strengths & weaknesses of VRLA
- Much of the criticism comes from our newest customers and markets (having the least background & knowledge of our industry)

# Ain't Nobody Happy...

## Users:

- Frustrated by complex warranty language, formulas
- Actual empiric experience with VRLA quite different from warranty programs offered
- Not unreasonable to expect long-life when offered a 20-year warranty

## Manufacturers:

- Feel they are unfairly blamed for failures due to factors beyond their control: installation, environment, maintenance
- Argue for increased user education & better practices
- Feel customers still demanding long warranties in specs

## Resellers/Distributors/Reps

- Stuck in the middle, trying to broker solutions between both sides



# Is There A Solution?

- Daunting task to challenge long-standing industry norms & practice
- Growing awareness that there is little correlation between warranties promised and actual life expectancy (VRLA)
- Plenty of blame to spread around... (Fix the problem, not the blame)
- Appearance of illogic or inconsistency breeds frustration, skepticism, & cynicism

*If we don't act, we run the risk of long-term flight of customers to alternative energy storage solutions*