Asset Health for Transmission & Distribution

Hennie Nel
The asset performance challenges

57%  $350B  42 yrs

26+ B  70%  36%
Why do customers need Asset Health?

Aging infrastructure
Information challenges
Aging workforce
Pressure for higher reliability
Defer or control capital expense
Flat O&M budgets
Ventyx view of asset maturity

- **1. Run to failure**
- **2. Time-based**
- **3. Usage-based**
- **4. Condition-based**
- **5. Predictive**
- **6. Reliability centered**
- **7. Financial optimization**

Optimized, predictive

Strategic, proactive
A holistic approach to asset health
Optimal maintenance yields significant savings

**33% savings**
- Large N.A. energy co: $31 M savings
- Mid-size N.A. energy co: $69 M savings

**20% savings**
- Mid-size N.A. energy co: $55 M savings

**16% savings**
- Mid-size N.A. energy co: $14 M savings

**10% savings**
- Mid-size N.A. energy co: $7.1 million savings

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Predictive analytics for asset performance

1. **Collect**
   - Unified view of all asset data in proven analytics platform
   - Multi-manufacturer equipment data from condition monitoring and historians
   - Data from enterprise systems (EAM, MWFM, asset reliability) and market

2. **Predict**
   - Algorithms codify experience to predict and prioritize risk
   - Mathematical algorithms codify years of industry experience to predict and prioritize risk

3. **Review**
   - Industry-standard approaches help confirm approach
   - Industry-standard approaches such as IEEE level comparison, historical data trending & fleet comparisons enable expert review and confirmation

4. **Act**
   - Holistic Asset Performance Management
   - Take action by integrating insights from predictive analytics into other Asset Performance Management and control software
Collect intelligence

Solution

IT

OT

AHC

Online

Offline

Sensor Data

Control System

CMMS

Financial

GIS

Inspections

Oil Samples

1
Predict Failure
Leverage Deep ABB and Partner Expertise

2 PREDICT

Industry expertise packaged in algorithms provide additional insights

ABB ALGORITHMS
- Short-Circuit
- Thermal
- Dielectric
- Accessory
- Miscellaneous

Risk of Failure
Understand Likely Cause of Failures
Actionable Intelligence and Insight Applied

3. REVIEW

Provide visibility and increased awareness of potential failures.

Leverage trusted industry methodologies (IEEE, Duval Triangles, etc.)

**Message Type** | **Detailed Message**
---|---
Action | IMPORTANT: Combustible gases may be associated with serious issues inside the transformer. All precautions must be taken while investigating sensor outputs.
Action | Several dissolved combustible gases have reached high or critical levels. Recommend minimizing load on this unit until issues can be addressed.
Actionable Intelligence and Insight Applied

Apply Predictive Maintenance Strategy to Asset Portfolio

Pass Actions directly to Enterprise Asset Management Systems
Asset Health Center – Feedback and Analysis

Collect Asset Data
- All Data Sources:
  - Sensors
  - Historian
  - Databases
  - Spreadsheets

Predict
- Pre-built Performance Models
- Do-it-Yourself Subject Matter Workbench

Review
- Data Processing and Analytics

Make it Available
- Advanced Operational BI

Make it Actionable
- Enterprise Asset and Work Management
Case Study: American Electric Power

**Situation:** 33% of AEP transformers > 50yrs old
18% > 60yrs old

**Challenge:** Prevent failures, optimize maintenance and support asset renewal prioritization

**Answer:** Ventyx Asset Health Center solution across all AEP transformers, breakers and substation batteries maintained by the transmission business unit
Case Study

Challenges

- Aging infrastructure
- Control O&M spend
- Reduce asset failures
- Prioritize asset renewals

Solution

AHC

Benefits/results

- Optimized O&M spend
- Centrally-focused intelligence
- Predictive insights = prioritize response
- Informed repair / replace decisions
- Codify staff expertise
- No incremental platform costs
Asset Health Value Modelling Process

CUSTOMER-Specific Information
- Asset Information
- Maintenance Costs
- Maintenance Maturity Level

Assumptions
- Failure & Maintenance Rates
- Event Reduction Rates
- Productivity Increases
- Replacement Costs
- Asset Lifetime Increases

Value Model

Projected Savings
Key Benefits of Asset Health Center

Transform real-time and historical asset data into strategic insights on the health of your mission critical assets

<table>
<thead>
<tr>
<th>Top Benefits</th>
<th>ABB Ventyx Can Help</th>
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<tbody>
<tr>
<td>Asset Condition Data Availability</td>
<td>Consolidate data on assets and their condition and make available to key stakeholders in timely manner</td>
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<tr>
<td>Optimize use of Local Knowledge</td>
<td>Deployment of advanced decision support tools</td>
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<tr>
<td>Early Warning on Failures</td>
<td>Provide visibility and increased awareness of potential failures to support operational decision making</td>
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<tr>
<td>Improve Asset Utilization</td>
<td>Information availability enables maintenance to be delayed on healthy assets</td>
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<tr>
<td>Condition-based Maintenance</td>
<td>Provide a path and strategy to applying condition-based maintenance strategy to asset portfolio</td>
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Questions

Hennie Nel
Industry Solution Executive
Ventyx South Africa
Cell: +27 60 554 7044
E-mail: hennie.nel@ventyx.abb.com
Asset Health Center