QUANTA TECHNOLOGY

TRANMISSION ASSET HEALTH MONITORING AND DIAGNOSTICS PROGRAM USE CASE

INDEPENDENT, OBJECTIVE, AND PRACTICAL EXPERTISE IN ELECTRIC POWER

USE CASE

The **Asset Health Monitoring program** was initially focused on reviewing substation monitoring opportunities, particularly for transformers. This project included developing a business case, issuing an RFP, and piloting transformer monitoring technology. Following successful implementation, the team conducted a cost-benefit analysis, secured funding for broader deployment, and established a framework to support monitoring and health programs for additional asset types. This methodology was extended to include monitoring for circuit breakers, batteries, underground cables, phasor measurement units (PMUs), and power quality (PQ) monitoring, driving standards, and organizational changes for system-wide deployment.

KEY BENEFITS

1. **Failure prevention:** Enhances safety, preserves public reputation, and reduces collateral damage.
2. **Optimized maintenance:** Lowers O&M costs, focuses resources on critical assets, and shifts from reactive to planned maintenance.
3. **Prioritized capital investment:** Enables data-driven decisions for replacing critical assets based on condition rather than age, supported by an algorithm and optimization tools like Copperleaf for efficient capital use.

Additional benefits include the development of RFPs for various monitoring technologies, establishment of standards across teams, and implementation of data governance best practices to ensure accurate and integrated asset management.

Customer/Industry Context

The customer is an integrated utility operating in multiple U.S. states, managing approximately 39,000 miles of transmission lines and over 900 transmission substations. Its transformer and circuit breaker populations exceed 8,500 and 24,000 respectively.

Problem Statement

The customer faced significant challenges in preventing equipment failures and optimizing maintenance. As one of the Senior Vice Presidents remarked, “My wife’s Honda Accord has more monitoring and diagnostics capability than my multi-billion dollar power system.” This led to a comprehensive monitoring and diagnostic solution addressing:
1. Failure prevention for improved reliability, safety, and compliance.

2. Optimized maintenance expenditures and workforce productivity.

3. Informed, prioritized asset replacement investment decisions.

Overview:

The customer partnered with a vendor to develop a solution integrating IT and OT data for a comprehensive asset management strategy. Initially focusing on high-voltage transformers, the program now encompasses all transmission assets, including circuit breakers, batteries, capacitors, and cables. The solution leverages Hitachi Energy’s Lumada APM, providing features like fleet-wide risk assessment, notifications/alerts, and prioritization of both short-term and long-term work, driven by data insights.

Technologies Used:

- Transformer monitoring (DGA, bushing, temperatures, partial discharge, cooling)
- Circuit breaker monitoring (I2T, fault data, temperatures, pressure)
- KeyCloak, Kubernetes, Grafana, ETL integration to IPS, OSI-Soft PI

Implementation Process:

1	2	3	4	5	6
Review transformer monitoring technologies.	**Create and issue** RFPs for transformer monitoring and an enterprise APM system.	**Select** vendors and technologies for pilot programs.	**Secure** leadership approval for pilot and APM funding.	**Implement** pilots and enterprise APM, following standard processes for planning, purchasing, engineering, construction, and testing	**Analyze** data **and refine** processes post-implementation.

Detailed Use Case Description

Specific scenarios:
Monitoring and data analytics prevented failures in 13 extra high-voltage transformers, reducing maintenance costs, and shifting priorities to condition-based rather than time-based maintenance. This data also supports capital investment decisions for regulatory rate cases.

Results and Benefits

Quantitative results:
- Prevented 10+ transformer failures, potentially saving up to $50 million.
- Achieved a 70% success rate in failure prediction (16 out of 23).
- Deployed over 400 transformer monitoring packages across multiple states.
- Transitioned to condition-based transformer maintenance, reducing manual DGA sampling frequency.

Qualitative benefits:
- Fewer catastrophic equipment failures through timely visibility and predictive analytics.
- Prioritized maintenance and replacement, reducing both failures and O&M costs.
- Optimized asset investment strategies with accurate condition information.
- Maximized network performance and improved productivity.
- Enhanced safety and regulatory compliance, increasing operational efficiency.

Customer Testimonial:

“...the AHC has been a tremendous success. It is preventing equipment failures, optimizing maintenance, and supporting asset renewal decisions. We have realized savings that offset the costs of the project. More importantly, we have provided a more reliable energy grid for customers and a safer work environment for employees.”

Challenges and Lessons Learned

Challenges:
- Change management within the company’s culture.
- Technical pushback based on past experiences.
- Issues with data quality, integration, and mapping.
- Learning curves for new technologies and processes.

Solutions:
- Actively listen to feedback and integrate it into solutions.
- Develop a disciplined data strategy to focus on critical data.
- Approach new technologies with patience, using challenges as learning opportunities
- Ensure comprehensive process and standard integration across the organization.

Lessons learned:
- Set high-level goals to engage stakeholders and measure success.
- Identify clear business requirements to prevent project creep.
- Implement a comprehensive, integrated solution from the start.

Visit our website at https://quanta-technology.com/asset-management/ to explore our Asset Management offering and see more project references.

For more information, connect with our Asset Performance Management experts via info@quanta-technology.com

INDEPENDENT — OBJECTIVE — PRACTICAL — EXPERTISE

NOT YOUR TRADITIONAL CONSULTANTS

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Who:

- Trusted advisors and solution providers with global utility experience
- Industry-recognized thought leaders
- Engineers and MBAs with the ability to address business and technology strategy, as well as the most specialized issues
- Experience spanning the entire lifecycle, from planning to EPC implementation with Quanta companies, to asset management and renewal

Why:

- Independent, objective, and practical advice and solutions
- Unique business, regulatory, and technical expertise and best practice know-how
- Unique SW and HW solutions
- Staff extension requiring technical skills
- Testing, commissioning, integration, and post-installation evaluations of technologies via sustainable technology integration labs

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