



CEATI ➤

Condition Monitoring Methodologies, Tools, and Practices

Overview

Understanding substation assets' conditions and their projected end of life is critical to aid utilities in making better decisions associated with asset maintenance and replacement to avoid unplanned asset failures and ensure reliable operations.

The monitoring systems themselves become additional assets with their maintenance and repair/calibration issues, and in some cases, it is possible that their benefits may not justify their overall incremental costs, which leads to other alternatives. This report delivers the results of an extensive literature search with a high-level functional specification and a business case approach for the implementation of online condition monitoring systems for major substation assets such as power transformers, circuit breakers, and station batteries.

**Stations
Equipment
Interest Group**

**Published:
September 2022**

How to use this research

This report presents the recommended practices utilities should make for the implementation of online condition monitoring systems and can help utility personnel to:

- Define what condition assessment data is required to accurately determining the aged condition of substation assets.
- Determine what data is best obtained using intelligent electronic devices versus manual condition assessment.
- Evaluate and compare intelligent electronic devices used to monitor condition assessment for various substation assets
- Deliver maintenance and calibration practice guidelines to be employed on IEDs and determine their end-of-life.

Key questions Addressed

- What is the online condition monitoring (OCM) strategy technique used by different utilities?
- What is the best practice of data management and analysis by utilities?
- What are the significant obstacles in online condition monitoring (OCM) implementation?
- What is the safest way of data compilation from different vendors on assets by utilities?
- What are the relevant standards and guidelines for monitoring an asset?
- What are the financial (cost /benefit) analyses for effective asset management?

Research Summary

This report is centered around online condition monitoring for major substation assets like power transformers, circuit breakers, and station batteries. The main chapters cover an extensive literature search, the results of a user survey, a high-level functional specification, and a business case approach for the implementation of online condition monitoring systems. Additionally, the report covers how to determine what condition assessment data is required to most accurately indicate the performance, condition, and loading capability of a substation asset. This, in turn, will help the utility engineer make optimal planning decisions for future unexpected malfunctions and the replacement of assets.

Subsequent chapters give information to utilities on the application and comparison of a new IED technology in the market. The study includes an evaluation of the functionality and performance of these devices, as well as their cost, reliability, maintenance, and calibration requirements. Their expected life span could also be added to maintain the guide as a vital resource well into the future.

As per the survey in the report, there is a growth in the application of online condition monitoring (OCM) systems by T & D utilities, majorly in power transformers. It provides a determination of the best practices to be employed to maintain the condition, ensure accuracy, and determine end-of-life for intelligent electronic devices used in online monitoring. Optimal use of software products for data collection, historicizing, analyzing, delivering, visualizing, and management of real-time data and events are discussed in the report for utility engineers. The results of this study will lead to “state-of-the-art” support in the growth of more cost-effective substation asset management and condition monitoring processes in the future.

The report offers recommendations on approaches to the execution of online condition-monitoring systems and related data management and analysis to develop a rationale and examples of a business case structure for the installation and use of a monitoring system in the utility asset management policy. These include in the report include making sure stakeholders and their roles are clearly defined and dedicating resources to the development of OCM and other related systems, amongst other ideas.

About CEATI Research

CEATI facilitates the planning and implementation of collaborative R&D projects among its electric utility members. This approach enables members to solve shared challenges and maximize their return on investment.

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