

Technology Innovation Project



Project Brief

TIP 239: Power Transformer Winding Resistance Demagnetizer Test Set

Context

Transformers in the high-voltage grid system are hugely expensive machines with equally huge lead times involved in their replacement when they go down. Anything that can credibly increase transformer reliability – especially in terms of physical situations that most readily and predictably occur with transformers – is highly sought. Such is the case with inrush current; high inrush current results in massive magnetic forces inside the transformer, which lead to undesirable movement of internal transformer parts. This movement is one of the top three conditions that shorten a transformer's life. The average age of a BPA transformer is currently 42 years; they are typically designed with a 50-year life span as the target. A successful demagnetizing test set and testing regime could be seen as cheap insurance for BPA's half a billion dollars worth of transformers.

Description

The project will advance the development of the prototype Power Transformer Winding Resistance Demagnetizer Test Set that was initially built by the BPA laboratories with funding from an FY11 exploratory project through the Technology Innovation Office. Bringing the new test set to market will make the technology available to BPA crews and to the industry at large allowing users to benefit from extended transformer service life, improved transformer availability, simplified maintenance procedures, and increased crew productivity. Protecting BPA's intellectual property will ensure that BPA retains control of the invention and will benefit from the investment already made to demonstrate its usefulness.

Why It Matters

There are significant benefits to completing the proposed project. At a strategic level, this project supports the BPA objective of enhanced grid reliability. The Transmission Technology Roadmap illustrates the direct linkage between 'Advanced Maintenance and Diagnostic

Technologies' and grid reliability. By reducing unwanted relay operations, this technology increases reliability and availability of BPA's existing power transformers. On a more practical level, the project includes the following benefits:

1. Eliminating residual magnetism reduces wear and tear on transformers and extends transformer service life.
2. The new test method reduces the probability that inrush current will cause the transformer to trip offline upon energization, which reduces unwanted relay operations and improves transformer availability.
3. Because the new test set is computer controlled and automatic, it simplifies the test procedure, freeing the operator to focus on interpretation of the data rather than performance of the test.
4. By combining two tests into one instrument, less test equipment is required which increases productivity of the test crew.

From a business perspective, this project offers the benefit of intellectual property developed internally to BPA. By capturing and securing this intellectual property, BPA ensures control over the technology and guards against the possibility of paying someone else a premium for technology developed internally. That is the key to future marketing efforts. This product would be a desirable acquisition for any utility world wide that operates and maintains power transformers.

Goals and Objectives

The objective of this project is to prepare the test set for commercialization. Specific tasks include field deployment and evaluation of test sets, securing the intellectual property associated with the invention, and identifying appropriate potential partners who can bring the device to market.

Deliverables

1. Six (6) completed beta prototype field trial units.
2. Report summarizing the field performance of the beta units.
3. Patent application (if applicable).
4. Peer-reviewed publication describing the invention.
5. Plan for the commercialization of the invention.

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Project Start Date: October 2011
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