



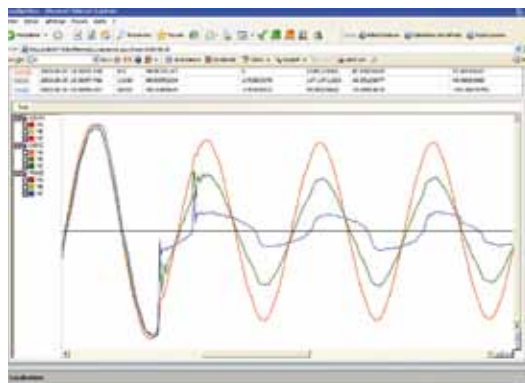
Faulty insulator

## MILE

### Intelligent power line maintenance

Hydro-Québec devotes considerable resources to improve the quality and continuity of electrical service. One of the company's strategic priorities is to strengthen the entire grid in order to minimize the frequency and duration of service interruptions.

MILE<sup>1</sup>, an intelligent maintenance system prototype, was designed and tested to do just that. MILE is used to locate transient faults, measure power quality and collect other information so that maintenance work can be better targeted. This new proactive maintenance approach is now being tested on seven distribution lines.



Web interface

### **An innovative fault-locating technique**

MILE implements a fault-locating technique based on triangulating voltage variations at a number of selected measurement points along power lines. An international patent is pending for the technique, which equals or surpasses in location accuracy other approaches presented in the technical literature to date.

<sup>1</sup> MILE = Maintenance intelligente de lignes électriques [intelligent power line maintenance]



Measurement module cabinet

The technique is unique in its ability to zero in on the probable location of a fault and deduce its arcing voltage. Since the magnitude of the voltage is proportional to the length of the electric arc, this often reveals the cause of the fault and the equipment affected. Arcing over a distance greater than one metre, for instance, is indicative of vegetation-related faults. Meteorological data recorded at the time of the fault is used to refine the analysis.

These functions help locate intermittent faults more easily and take timely maintenance action, thus considerably reducing the number of distribution system outages.

### **Other advantages**

- > Fault location
  - Fault current and voltage estimated for each potential location
  - Technique with 1% precision, little affected by topology and line impedance errors
- > Simple measurement equipment
  - No calibration
  - Use of commercial grade power quality measuring equipment
  - Use of existing smart grid equipment and infrastructure (AMI, ADA, etc.) possible
  - Easily installed on low-voltage grid
- > Distribution system maintenance
  - Latent faults more easily located
  - Vegetation control assisted
  - Damaged fuses located
  - Customer complaints answered without mobilizing technical crews
- > System control
  - Outages more quickly located
  - Alternative to fault indicators provided by triangulation of voltage variations
- > Access to MILE data from Web interface
- > Remote system-wide monitoring of power quality

### **Technical specifications**

- > Modern Web interface (Microsoft .NET)
- > Object-oriented software developed in C#
- > Interoperable interface for reading waveforms using the following connectors:
  - ION meters with ION Enterprise software
  - Hydro-Québec Mini-AQO power quality analyzer
  - GridSense PM40 power quality analyzer
  - Basic instrument developed for MILE
- > Interface compatible with CYMEDIST (CYME International) and IRD (Hydro-Québec) system topology formats
- > External meteorological data used as input
- > Outages recorded in the Distribution Management System (DMS) used as input

### **For information:**

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#### **Patent**

PCT/CA2008/000691

#### **August 2011**

2010G080-26A