DTE Energy Introduces Performance Contracts

Case Study

With deregulation at hand, electric utilities face the prospect of their best customers leaving for "a better deal." If utilities don't find new ways to retain or attract key customers, they could be crippled by declining revenues.

How can a utility avoid this scenario? DTE Energy has responded to this challenge by designing new service contracts that entice their large industrial clients into long-term relationships.

DTE's 10 power plants supply two million people, with almost 9 percent of its peak 10,700 MW system load tapped by such industrial heavyweights as DaimlerChrysler, General Motors, and Ford.

Power Quality Guarantees

DTE's strategy: determine what their customers' main interests are, and develop contracts to satisfy those specific needs. Some of DTE's largest users, in the steel industry, are interested primarily in price and have entered into multi-year contracts based on discounted, interruptible rates.

The automotive companies, however, want more than just a good price. Power quality disturbances are especially costly to their manufacturing plants. After an outage or voltage sag, machines must be unloaded, re-tooled, and re-sequenced, and in-process parts scrapped.

Insisting that energy supply contracts focus on power quality, automotive manufacturers joined DTE in an unprecedented effort to quantify the quality of service and set performance targets.

The result is a "Special Manufacturing Contract" (SMC). Along with target power quality levels, the deal includes monetary incentives for DTE to perform as required. If the specified levels are not maintained, DTE must pay penalties to the customer.

Metering to Support Commitments

Jim Evans, Principal Engineer at DTE, explains, "To uphold our obligations and avoid penalties under an SMC contract, we needed to monitor customer loads, verify quality levels, and pinpoint disturbance sources. We found a way to do all this with a single power monitoring system."

Application	Utility and Automotive
System	7700 ION meters 3720 ACM meters
Benefits	Value-added services Increased revenues Improved performance Fast problem response Simple integration Expandability

(from left to right)
Gus Gazepis, Protection Engineer, **Jim Evans**, Principal Engineer, and **Jeff Erard**, Voltage Control Engineer, analyze power quality using data automatically gathered from customer sites.

a company of Schneider Electric

POWER MEASUREMENT

The system uses Power Measurement meters and software. The 3720 ACM digital power meters transmit real-time load and power quality data from customer sites to DTE's Operations Center. Power monitoring software supplies voltage variation data to a customized power quality database system. This system, under the responsibility of Planning Engineer Andy Detloff, generates reports that characterize disturbances.

DTE account executives use the reports to inform customers about the company's performance related to the power quality provisions of the contracts. DTE pays penalties only for outages and voltage sags that fall below 75% of normal voltage. This encourages DTE to keep events above the 75% mark.

Disturbances Translate Into Pay-Outs

Along with monitoring power quality and recommending equipment to prevent disruptions, DTE had to find the right fault locating tools. "For us," Evans remarks, "every disturbance that affects an SMC customer represents a prospective pay-out. We'd like to avoid pay-outs by immediately locating and fixing the sources of problems."

Disturbances are often triggered by faults (short circuits) on a power transmission system. Faults are caused by lightning, insulator failure, fallen branches, or animals, and can be cleared within seconds by momentarily interrupting the current.

Yet even after a fault is cleared and power restored, it can recur until its source is found and removed. If the source isn't instantly identified, DTE may have to make repeated pay-outs.

Locating Subtransmission Faults

The majority of DTE's SMC customers are fed directly by 120 kV transmission systems, but 35% are fed by 24 kV and 40 kV subtransmission systems.

Sites fed by subtransmission-level lines are more exposed to disturbances. Most of these lines are constructed next to public roadways, not limited-access corridors like transmission lines. Also, a greater number of lines are connected to buses, causing more substations and customers to be affected by faults.

When DTE first established SMC contracts, tools for identifying subtransmission faults were meager. But Protection Engineer Gus Gazepis and Voltage Control Engineer Jeff Erard discovered that 3720 ACM meters and Aspen One Liner® software could provide the right data.

With Aspen, Gazepis and Erard could apply complex line impedance models and incrementally slide a fault along a line while observing the associated changes in theoretical customer site voltage. When the theoretical voltage matched the voltage measured by the 3720 ACM meters, the engineers could quickly correlate the fault's position in the model with actual geographic information about the line. That determined the precise physical location of the fault.

Justifying Expansion

The power monitoring system has yielded substantial savings by facilitating the quick location of faults. It may even reduce the need for line patrols in deep right-of-way.

DTE can now justify an increase in voltage monitoring.

DTE engineers are planning 40 kV subtransmission bus monitoring with 7700 ION meters, chosen for their large data storage capacity and high waveform sampling rate. Gazepis and Errard have also proposed the addition of 3720 ACM meters on transformer feeds to 13.2 kV distribution substations.

Through its alliance with the automotive industry, DTE has gained a greater sensitivity to power quality, and the resulting new tools have significantly improved customer satisfaction.

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visit our web site at
www.pml.com

email us at
sales@pml.com

call us toll free at
1-877-METER-IT
(1-877-638-3748)

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