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**Power  
Generation**



Photo courtesy of Richard Visser.

# Standby Power

## **Case History**

Okemos, Michigan

### **Where:**

Delta Dental of Michigan, Okemos, Michigan.

### **What:**

Three Cummins 1000 kW standby diesel generator sets, with a Cummins PowerCommand® paralleling system with two DMC 200 Digital Master Controls.

### **Purpose:**

Provide standby power for a state-of-the-art data center.

### **Primary choice factors:**

Reliability, innovative system design for redundant paralleling switchgear.

## **Delta Dental of Michigan chooses Cummins Power Generation for new Tier 3 data center**

Delta Dental of Michigan, with its affiliates in Ohio, Indiana, Kentucky, New Mexico and Tennessee, is one of the largest dental plan administrators in the United States. In 2009, the enterprise paid out nearly \$2 billion for dental care on behalf of more than 6.4 million enrollees. Offices are located in Okemos and Farmington Hills, Michigan; Columbus and Cleveland, Ohio; Indianapolis and Greenwood, Indiana; Louisville, Kentucky; Albuquerque, New Mexico; and Nashville, Knoxville and Memphis, Tennessee.

### **Thoughtful planning**

Delta Dental of Michigan is headquartered in Okemos, Michigan, not far from the Michigan state capital of Lansing. A great deal of thought and extensive planning went into the



The paralleling switchgear and a generator set being installed at the new data center.

new 22,500-square-foot data center addition to their campus.

**Cooling.** For example, cooling units use outside dry coolers when the temperature is at or below 73°F, which occurs a large part of the year in central Michigan. This approach saves considerable energy.

**Protection.** The generators and cooling equipment are housed in a tornado-proof, walled-off area with a multilayer roof. Heavy steel doors and electronic security access systems limit admittance to authorized personnel. These measures help ensure that both valuable equipment and data are safe from the elements and unauthorized access.

**Expansion.** The data center accommodates 250 servers now, but it is designed to handle as many as 1,000 in the future. However, the ability to expand doesn't stop with adding servers in the new building. The data center itself can be replicated with the addition of a mirror-image building next door.

### **N+1 Redundancy in standby generators**

The same thoughtful planning went into the design and selection of a backup power system. Delta Dental wanted to ensure that electric power would always be there to keep the servers and networks running. Thus, the design for standby power is unusually resilient.

For example, there are three 1000 kW diesel generator sets from Cummins Power Generation, even though two would have been sufficient to power the current load. This N+1 redundancy means that the data center always has one extra generator in reserve in case there is a problem with either of the other two. When future growth dictates that three generator sets are required to handle



Three 1000 kW generator sets after installation. One is always in reserve. (Photo courtesy of Trumpie Photography.)

the increased load, a fourth generator set will be added to maintain N+1 redundancy.

So, no matter the load — today or in the future — forward thinking and planning ensure that the generator sets will provide clean electrical power within seconds of a failure in the utility grid.

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### **Redundancy in paralleling switchgear**

When multiple generators are installed for standby power, they must be synchronized before they can connect to the bus and assume the electrical load in the event of a power failure. The frequency, voltage, phase angle and phase rotation of the generators involved must be within certain limits before the generators can supply power. This synchronizing is the job of paralleling switchgear.\*

As part of its plan for N+1 redundancy, Delta Dental installed a second set of paralleling switchgear. Cummins Power Generation worked with the company to devise an industry-first system for automatic failover between the two paralleling switchgear systems. Like the generator set redundancy, if one paralleling system does not operate, the other will automatically take over without missing a beat.

\*Paralleling dissimilar generators can be a complicated undertaking. Cummins Power Generation has published a series of white papers on the topic available [here](#).

### Tier 3 Uptime Institute rating

These extra layers of protection provide an unusual degree of resilience for emergency power distribution at Delta Dental's data center. Though redundancy was mandatory, the objective was to create a more cost-efficient solution rather than a system that simply doubled the number of generator sets to realize the same level of reliability. That goal was achieved and exceeded with the installation in existence today.



As a result of this innovative design, the new data center is one of only a small number in the world to have earned a Tier 3 rating for its design from the Uptime Institute. One of several criteria necessary to receive a Tier 3 design rating is a capability known as concurrent maintainability. Essentially, this is the ability to perform maintenance tasks while the data center continues to operate normally.

Delta Dental of Michigan is setting a new state-of-the-art standard at its Okemos data center. Cummins Power Generation is proud to be playing a key role in their innovative approach.



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