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Critical Protection: Healthcare

Case History

Primary Children's Medical Center
of Intermountain Healthcare

Where:

Salt Lake City, Utah, USA

What:

- PowerCommand® DMC 300 paralleling system
- One DQGAB 1500 kW generator set
- Two DQGAA 1250 kW generator sets

Purpose:

A hands-free emergency standby power system that ensures the hospital has power 24/7, 365 days per year, not only for critical systems, but for over 90% of the entire facility during a power outage.

Primary Choice Factors:

- Previous experience with Cummins
- A paralleling solution that overcame incompatibility issues
- Outstanding customer support

Cummins overcomes alternator pitch incompatibility and space limitation

Providing children's healthcare in an atmosphere of love and concern is the guiding mission of Primary Children's Medical Center. Primary Children's Medical Center is dedicated to providing outstanding pediatric care, child advocacy, medical education and research. This commitment has earned the hospital national recognition. It was named among the Best Children's Hospital for 2011-2012 by *US News and World Report* in several specialties.

The medical center started in 1911 as a church-sponsored children's ward at Salt Lake's LDS Hospital. Today Primary Children's Medical Center is an acute care facility for a five state region. "We are the only full-service pediatric-specific hospital in Utah, serving a five-state region including Idaho, Montana, Wyoming, Nevada and Utah," according to Mark Hodges, director of engineering, Primary Children's Medical Center.



The system included a DMC 300 Digital Master Control.



Cummins installed one DQGAB 1500 kW and two DQGAA 1250 kW generator sets.

Providing award-winning child care takes a reliable power system

For the hospital to continue providing award-winning healthcare, the aging power generation system needed to be replaced. “The facility was built with cogeneration engines which were natural gas fueled,” according to Hodges. “Because of age on the cogeneration engine, end-of-life support was going to become a problem, especially with the engine block. Maintenance and support were becoming a big issue, and it was becoming very costly to maintain them.”

Energy costs for the cogeneration system were also a concern. Hodges explained that over the years, since this facility was built 20 years ago, natural gas prices had increased to the point where it actually is less expensive to buy utility power than to generate their own.

Power output limitations were another problem for Primary Children’s Medical Center. The system was unable to provide enough power to meet their needs, even with the addition of a diesel generator. “A second emergency diesel generator was added because of capacity issues,” Hodges said. A Caterpillar 1500 kW diesel generator was installed eight years ago to increase the power output.

All of this created a system that was no longer hands free and required manual operation. “When we added that generator and paralleled it, it required a lot of the automation with the original sets to be disabled or removed,” Hodges said.

Seeking a hands-free system and more power

“We wanted a hands-free system so that when we had a power outage, all we were doing is verifying the breakers are online, and the system is coming on line,” Hodges explained. “When we added that Caterpillar generator we had to do it all manually in an outage.”

Primary Children’s Medical Center also wanted a system that would increase the amount of power they had available. “They had a cogeneration system that had three 600 kW natural gas generators and one 1250 kW diesel generator that were paralleled together. The diesel generator was their emergency generator,” according to Jeff Richards, principal, Spectrum Engineers. They wanted a system that would meet emergency power generation system code requirements for egress lighting, patient monitoring systems, patient rooms, operating rooms and diagnostic equipment. They also wanted a solution that would provide power for chillers and other non-essential equipment.

In total, the hospital required 4 MW of energy for powering nearly the entire facility. Primary Children’s Medical Center also wanted to incorporate the Caterpillar generator set as part of the system. The solution was to install three new generator sets and a DMC 300 Digital Master Control from Cummins Power Generation. “They installed three new generators, one 1500 and two 1250’s,” Richards said. “The two 1250’s replaced the cogeneration system, and the others create the standby source for the essential power systems”.



One challenge was paralleling a Cummins and Caterpillar generator set.



Cranes were used to lift pieces of the generator sets into the installation space.

“They also wanted to parallel two new 1250 kW units to back-feed the balance of the hospital load as well as add another level of redundancy to the transfer switches serving life safety and critical systems,” according to Ken Wormington, western division sales manager for the local distributor, Cummins Rocky Mountain. “This system is also capable of utility paralleling to provide a seamless re-transfer upon utility restoration.” The two paralleling systems are tied together via a PLC with a redundant PLC running simultaneously. These systems also provide monitoring and control from various PC’s in the hospital’s engineering offices via network connection.

The solution provided a complex, yet hands-free, system with enough power not just for critical lighting and equipment, but also for air handlers, non-emergency lighting and the parking lot.

“I would say 90 to 100 percent of our building can be powered on back-up power, depending on the season,” Hodges said.

Overcoming challenges in pitch

Primary Children’s Medical Center wanted to utilize the 1500 kW Caterpillar diesel generator set as part of the emergency standby system. This request created many challenges for the engineering team from Cummins Power Generation, Cummins Rocky Mountain and Spectrum Engineers. Cummins Power Generation and Caterpillar generator sets have a different winding pitch, making them incompatible for paralleling.

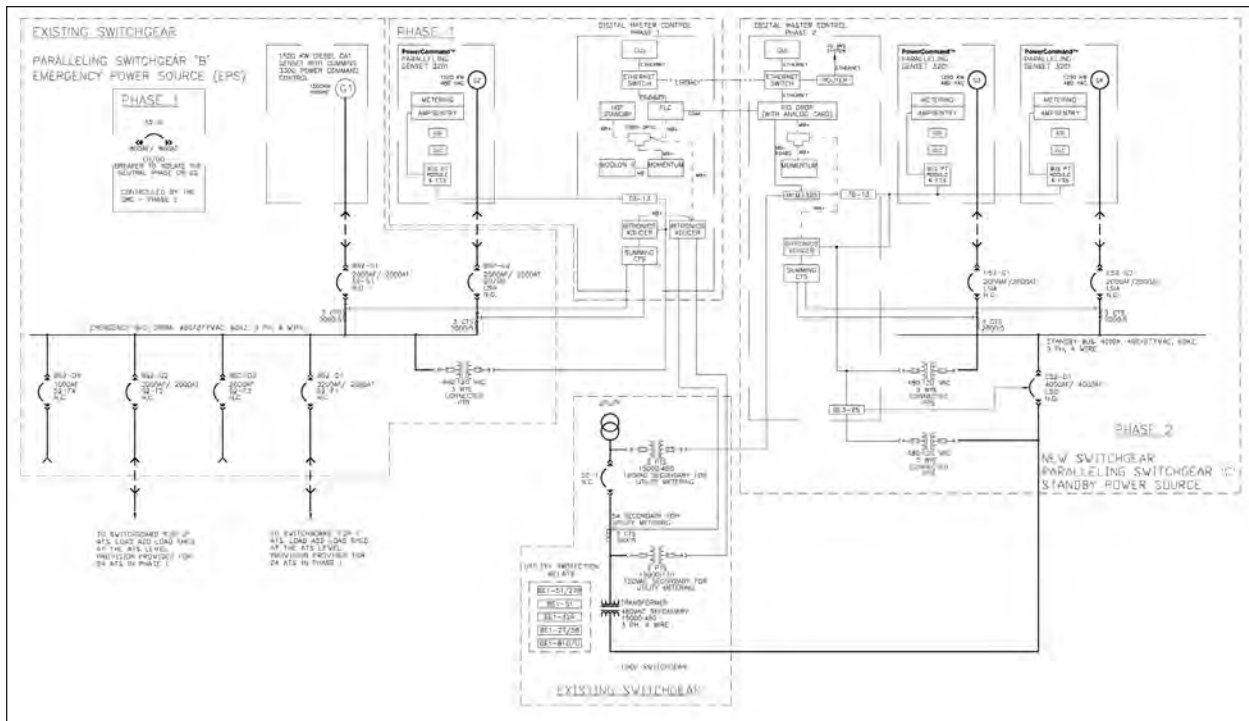
“The unique challenge was the winding pitch on the Caterpillar was different than the Cummins generator,” according to Richards. “They get a circulating current that can damage the alternator.” The solution was adding an automatic disconnect switch that would take the neutral of the Cummins generator offline when both were paralleling, to prevent circulating currents.

“The path was taken to utilize the new 3.3 controller on the Caterpillar unit and to employ a motor operated breaker on the neutral of the new 1500 kW Cummins unit to solve the paralleling obstacle,” according to Wormington. “The units were then controlled and monitored by a DMC 300 Digital Master Control which also monitored and controlled all of the existing transfer switches.

Delivering the equipment through a small space

Another issue was delivering the generator sets to their installation location within the facility. The two 1250 kW units had to be passed thru a small opening in the parking structure and lowered into the generator room 20 feet below. “Both of these are in a basement area on underground levels,” Richards said. “To even get a Cummins generator into the space we had to drop it on its side through a small area into the basement by crane. It had to be taken apart in order to do that, and it’s not something we do every day.”

They also had to ensure a power source was available in the event of an outage. “All of the demolition, installation and testing was done with the hospital still in operation and providing services and care to these precious kids,” Wormington said. It was also done in the middle of the night. Cummins Rocky Mountain provided a 2MW rental generator to meet emergency power needs and technicians were on-site for every part of the project. “The rental generators which we brought onsite and hooked up were really important during both changeovers, first for the essential system changeover and then for the standby system changeover.”



A one-line drawing of the emergency standby power system.

Meeting customer needs

Cummins not only overcame a formidable list of challenges, they also provided a solution that met all of the customer's needs. The outdated cogeneration system was replaced with a reliable power source and using the latest power generation technology. The hospital now has a system configuration that enables paralleling with the local utility. Primary Children's Medical Center has gained the convenience of one master control for the for the entire system. They have dependability guaranteed by local support from Cummins Rocky Mountain, to keep the system operating smoothly. Furthermore, the hospital got the capital equipment return-on-investment they were looking for.

A responsive partner for Primary Children's Medical Center

Primary Children's Medical Center has given Cummins Power Generation high marks for its role in the project. "We're very pleased with Cummins, there are always going to be challenges, but it is how these are handled as you work through them that means the most. I would give Cummins high marks on that," Hodges said. "I like that they are very responsive."

A recent example given by Hodges was "The other day the technician, who I am sure was scheduled in other places, turned his truck in our direction and got right up here to troubleshoot what was going on."

Further accolades were expressed by Richards at Spectrum Engineers. "They (Cummins) have always been a great partner, assisting with the design and answering questions about the startup and testing. They were good about being there on time, real efficient about doing the testing, and if something did go wrong, getting it fixed as quickly as possible."

By the end of the project Primary Children's Medical Center had what they were looking for. They had a integrated system designed and manufactured by one company to work seamlessly as an integrated system. The hospital also once again had a power system that was automated, replacing the need for manual power transfer. Furthermore, standby power that was available 24/7 with service and support to keep the system running smoothly for years to come.

For more information about Cummins Power Generation systems currently in use around the world visit www.cumminspower.com.



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 F-2345 (11/11)