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**Power  
Generation**



# Healthcare Critical Protection

## Case History

### Where:

AnMed Health Medical Center,  
Anderson, South Carolina

### What:

- Three Cummins 2000 kW diesel-fueled generator sets
- PowerCommand® paralleling system with remote monitoring

### Application:

Emergency standby power

### Distributor:

Cummins Atlantic

### Primary choice factors:

- Start-to-finish technical assistance, from preliminary design through installation and testing
- Management of complex interactions with multiple vendors
- Expert local service and support

## Major upgrade at AnMed Health Medical Center wins VISTA Award for Infrastructure

The AnMed Health Medical Center in Anderson, South Carolina, has been serving its community for over 100 years. Following several major expansions in recent decades, hospital executives recognized the need to upgrade the center's electrical power system infrastructure to meet increased energy demands, improve overall power reliability and ensure the facility met or exceeded the latest NEC code requirements.

The hospital developed detailed specifications and sought bids for a comprehensive upgrade to its electrical plant, including a new emergency power system. Cummins Power Generation won the competitive bidding process and was selected as the primary supplier for a complete emergency standby power system. Another advantage was that the engineering firm that AnMed hired to work on the project, PerryCrabb, was already familiar with Cummins Power Generation systems.

In addition, Cummins Atlantic, the local distributor, had been providing maintenance services at another AnMed facility.

The comprehensive upgrade also included:

- An expanded central utility plant
- Normal and essential power distribution risers for all eight floors of the hospital
- New distribution risers for data and telecommunications
- A high-rise fire alarm system
- A customized power monitoring and control system



The PowerCommand® generator sets and control equipment installed in the basement of AnMed Health Medical Center.

## Designing the new system: a complex undertaking

Peter Andersen, Director of Electrical Engineering for PerryCrabb, emphasized, “When you’re working on a complex design, you need to figure out what is feasible. That’s why we had several detailed discussions about a preliminary system design and the sequence of operations in the planned power system with Ken Box, Cummins Southeast Regional Manager for Power Electronics.”

The regional Cummins distributor, Cummins Atlantic, then brought in its technical salespeople as well as engineers from the Cummins manufacturing plant

to design exactly how the generator sets, transfer switches and digital master control (DMC) equipment would interact with utility power.

## Testing and installation

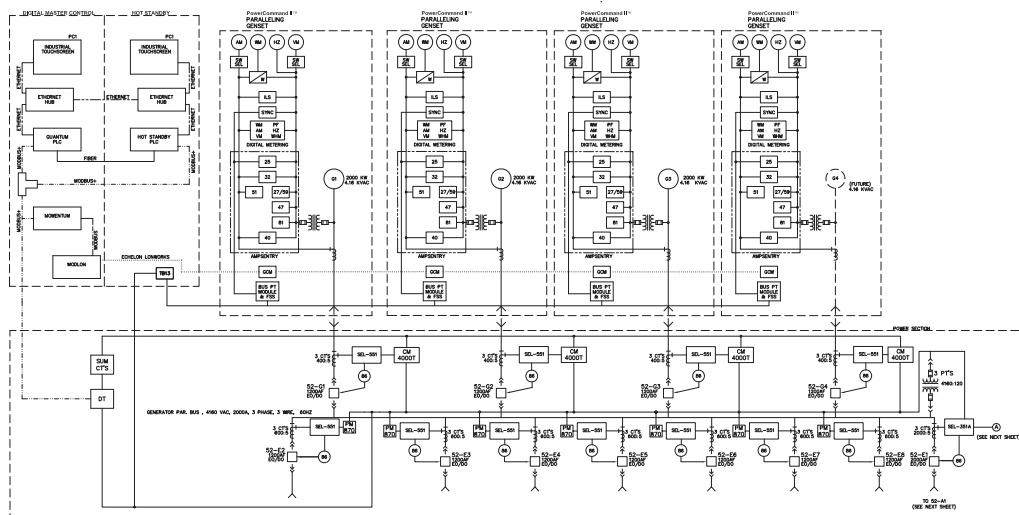
A factory “witness” test was then conducted at the plant in Fridley, Minnesota. Cummins engineers built a custom “mimic” printed circuit board to simulate how the utility power would interoperate with the Cummins DMC, and they also tested all the DMC inputs and outputs.

Then came the actual installation of the generator sets and DMC equipment. Cummins Atlantic took the lead, managing a complex series of interactions with multiple vendors, including Square D and Schneider Electric. The new system was built alongside the one being replaced. The plan called for loads to be gradually transferred from the old to the new system, and then the old one would be dismantled.



The PowerCommand® DMC with paralleling gear.

One crucial change was the replacement of an old single-branch emergency power system with a new three-branch system. The older system had been grandfathered in, but the overall upgrade was the opportunity to comply with the current code requirements, which are mandated by the National Electrical Code (NFPA 70) and the Health Care Facilities Code (NFPA 99).



This one-line drawing shows the complexity of the system.

These codes require that emergency power be divided into:

- The *life safety* branch, which is limited to a few functions like egress lighting and alarm systems. This branch must be restored within 10 seconds.
- The *critical* branch, which serves lighting, receptacles and circuits relating to patient care. These functions must also be restored in 10 seconds.
- The *equipment* branch, which serves major equipment essential to the operation of the hospital like air-handling systems and elevators.

The new three-branch system not only meets current code requirements, it is also more reliable and efficient. Plus, it allows the hospital to undertake other needed improvements, which would not be permissible otherwise.

A four-hour “blackout” test was the final step in the installation. This test is mandated by NFPA 110 acceptance test requirements to ensure functional performance of the life safety and critical branches. As Chuck Parker, Director of Engineering Services for AnMed Health, said, “Our acceptance test went beyond the NFPA requirement. We pulled the plug completely on utility power. Because we had sized the Cummins power system to support both emergency and non-emergency loads, the generator sets picked up the entire load; the lights never blinked.” With this flawless test result, AnMed managers were confident that they had a robust, safe system that could do the job for which it was designed.



The DMC provides system-level functions, including load add and load shed sequencing, load demand, and system operator interface.

## Ready for growth

With the new system of three 2000 kW generator sets, paralleling switchgear and automatic transfer switches in place, the hospital now has enough emergency power to handle the loads of the entire facility. But foresight planning for the new emergency power system also took into consideration the need to handle increased loads in the future. A fourth generator set can be easily installed — without interrupting service or adding to the wiring or switchgear — to maintain N+1 redundancy. Closed-transition automatic transfer switches eliminate disruption for testing or anticipatory transfers.

## Weathering storms and the “black snake” test

Recent events have further proved the new system in real-life emergencies. Shortly after the system was installed, a black snake found its way into the hospital's dedicated electrical substation, short-circuiting the supply of utility power. The standby system kicked in automatically and performed exactly as planned, picking up emergency loads within the required 10 seconds. In addition, the hospital has switched to generator power during thunderstorms; patients and staff were completely unaware of the power transfer.

## Solving complex problems with great teamwork

Successfully executing such a major upgrade to a century-old facility under tight deadlines while the hospital continued to function was a complex planning and logistical challenge. As Chuck Parker explained, “We were replacing the entire electrical system. We moved all the normal, non-emergency circuits over to the new system one at a time. Then we made one big transfer of the emergency circuits for the new construction part of the project, and then another big switch for the older part of the hospital. In order to make this happen, the different vendors and contractors supported each other and worked together very well.”

This teamwork included the hospital's management and engineering staff as well as several external firms:

- McMillan Pazdan Smith, architects
- PerryCrabb, engineering firm
- M.J. Harris, general contractor
- Schneider Electric, manufacturer of electrical distribution products
- H.R. Allen, electrical contractor
- Cummins Atlantic
- Cummins Power Generation

In particular, the success of the project was due in part to the excellent working relationships among H.R. Allen, PerryCrabb and Cummins Atlantic. Because the three firms had worked together on previous projects, they had developed a broad understanding of the different roles, expectations and personalities involved.

“It was a total team effort,” said Brian Violette, Vice President of H.R. Allen. “There was continuous coordination among the vendors involved and with AnMed. Take power monitoring, for example. We had to develop and fine-tune a custom system that would enable the remote monitoring capabilities of the Square D equipment and the Cummins paralleling switchgear to work together to give AnMed the visibility they wanted.”

Among other examples of problems solved, the architects found unused space that could be repurposed for riser closets. The contractors disassembled large pieces of electrical equipment to move them through narrow hospital corridors, and then reassembled them in their new locations.

The construction and installation crews cut into the concrete foundation of the hospital to install the generator sets in the basement. The crews also used electric-powered excavators to avoid fumes drifting into the hospital and also worked around the clock to meet a demanding schedule.

### **First-rate results: increased safety and national recognition**



That teamwork has paid off with a state-of-the-art electrical system for AnMed Health Medical Center that protects patients and staff. These first-class results have won national recognition with a VISTA Award for Infrastructure.

Since 1993, the American Society for Healthcare Engineering (ASHE) of the American Hospital Association (AHA) and the American Institute of Architects Academy of Architecture for Health (AIA/AAH) have recognized design and construction initiatives across the United States through the VISTA award program. There are three categories of awards: New Construction, Renovation and Infrastructure.

The Infrastructure award is presented to an organization that has modified or replaced major portions of a facility's utility generation, distribution or control systems, which involves significant project planning. The AnMed Health Medical Center upgrade won the 2011 Infrastructure award, which was presented at the ASHE PDC conference in Tampa, Florida, in March 2011.

Chuck Parker summed up the significance of the award: "The VISTA award was a testament to the difficulty of the challenge, the quality of the design and the excellent teamwork among all the people and companies involved."



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