



Power Generation

ROLLS-ROYCE POWERS LEADING INTERNATIONAL HEALTHCARE TECHNOLOGY COMPANY

Who Cerner Health Services
What Three 1,750 kWe MTU Series 4000 generator sets
Where Malvern, Pennsylvania, USA

Over the years, CTC-Malvern (formerly known as Siemens HCC 2000-2014, constructed by Shared Medical Systems ISC 1979-2000) has implemented continuous improvements to its critical infrastructure to eliminate single points of failure. In 2014, the company completed a large-scale project to upgrade its primary electrical distribution system, including new switchboards, transformers and a suite of advanced generator sets designed to communicate seamlessly with peripheral equipment and handle existing loads, while offering the flexibility to carry increased load as the business grows.

In February 2015, Cerner Corporation announced the completion of its acquisition of Siemens Health Services. The joining of these two powerhouse companies strengthens Cerner's global presence and bodes well for the industry as next-generation health IT solutions are developed to help control costs, enhance patient experience, and protect health data.



A Rolls-Royce solution

Healthcare data centers, like the Cerner Technology Center CTC-MV in Malvern, Pennsylvania, protect critical electronic patient health records (EHR) that, if made susceptible to breach, could have far-reaching and long-term effects on both patients and providers. According to the Washington Post, nearly half of all major data breaches reported in 2013 were in the healthcare sector and that number is expected to grow as patient data is increasingly targeted. With this steady increase in network hacking, healthcare facilities have been prioritizing data security, which starts with power security.

Loss leader

One of the most common causes of data loss in healthcare is unexpected power-supply failure. Data centers are a vital part of every healthcare facility and the management of health records can consume up to 100 times more energy than a standard office space, putting enormous strain on the power grid. A key component in the prevention of data loss is emergency backup power generators to protect against outages.

With 18,000 facilities in over 30 countries to protect, including hospitals, blood banks, pharmacies and urgent care centers, the CTC team (at the time operating as Siemens Health Services) embarked on a large-scale project to upgrade its aging electrical infrastructure under the leadership of Lane Keyser, critical facilities engineering manager. Like most critical facility managers, Keyser's worst nightmare was two-fold: managing the growth of high-density computing systems' thirst for power, and sustaining long-term electrical support if the electrical grid were to fail by natural or intentional actions.

"Without our unfaltering support, hundreds of hospitals would not be able to run vital, life-sustaining processes," said Keyser. "Our aging infrastructure needed a heart transplant."

The brand-new electrical system would require additional, more powerful generator sets to support the needs of the existing data center and a possible addition. Three MTU Series 4000 generator sets, contained in Level 2 sound attenuated enclosures, specifically designed for continuous runtime, were selected.

Powerful proficiency

To meet precise performance and functional requirements, the design team contracted local MTU distributor Emergency Systems Service Company (ESSCO) for specification of the three units. Rated at 1,600 kWe prime/1,750 kWe (standby), the MTU generator sets are approved for an 85 percent 24-hour average load factor (15 percent above industry standard) and renowned for best-in-class reliability and availability. The EPA Tier 2-certified units also offer versatility and flexibility in design, a key requirement for the project. A sophisticated and complex project, ESSCO provided design assistance and project management for a full suite of emergency power system equipment, including new paralleling gear, redundant programmable logic controller (PLC), 1,600 kW resistive load bank, 2,000 amp portable generator quick connects, fuel polishing system, and a 15,000 gallon main fuel tank.

- 1 Outside the Cerner Technology Center, MTU Series 4000 generator sets are contained in Level 2 sound attenuated enclosures.
- 2 MTU Series 4000 generator sets are approved for an 85 percent 24-hour average load factor (15 percent above industry standard)
- 3 A sophisticated control system of Siemens PLCs coordinates the seamless operation of seven generator sets, four switchboards and two utility sources.



“The success of our decade long relationship of upkeep and reliability, assured me that ESSCO would bring the correct mix of talent and technologies to the project,” Keyser shared.

With a goal of adding capacity while eliminating single points of failure, the team took a unique approach. Partnering with Enercon Engineering of Peoria, Illinois, ESSCO renovated the existing lineup of paralleling gear and Detroit Diesel generator sets using industry standard digital controls. Enercon implemented the system on the specified Siemens PLC devices, which were used to coordinate the operation of the four Detroit Diesels and three new MTU generators.

With seven generator sets, four switchboards and two utility sources, the numerous PLCs are an essential element as they make decisions based on available sources, when, where, how and if they should to respond to changing power conditions. The sophisticated control system of Siemens PLCs, which oversees the entire infrastructure, was architected by Jeff Jerome of Siemens Industries. “The self-healing dual architecture runs the show, selecting between any of the numerous conditions the electrical ‘ring’ buss can encounter,” noted Keyser.

Cerner’s mission is “to contribute to the systemic improvement of healthcare delivery and the health of communities.”

“It was important that all the equipment run in synchronization,” said Joseph Stillman PE, chief electrical engineer at Sharpe Engineering, a full-service mechanical, electrical, plumbing and fire protection engineering firm that supported the project. “The PLC system really made the entire paralleling process seamless and effortless.”

Carrying the load

Being a mission-critical operation required that installation and commissioning take place with no disruption to the critical load or any of its support systems. To that end, Keyser and his team journeyed to Mankato, Minnesota for factory witness testing of its new generator equipment.

“We needed to install the new generation equipment and be able to rely on it right out of the box,” said Keyser. “This would ensure our electrical contractor, Union Electric, could safely migrate the entire building full of critical equipment. Seeing it put through its paces instilled confidence that the units would perform when needed.”

Rolls-Royce provides world-class power solutions and complete lifecycle support under our product and solution brand MTU. Through digitalization and electrification, we strive to develop drive and power generation solutions that are even cleaner and smarter and thus provide answers to the challenges posed by the rapidly growing societal demands for energy and mobility. We deliver and service comprehensive, powerful and reliable systems, based on both gas and diesel engines, as well as electrified hybrid systems. These clean and technologically advanced solutions serve our customers in the marine and infrastructure sectors worldwide.

Managing all of the players skillfully through countless issues, Jim Marks with ESSCO executed the project flawlessly, according to Keyser. “We had no alternative but to trust the talents of so many people doing their job right the first time,” he said.

Once all of the facility loads were safely migrated, the existing generator complex was upgraded, tested and commissioned in a live setting. Union Electric completed all of the wiring for all power and communication. The state-of-the-art installation of the MTU generators makes reliable power available any time. In June 2015, a mandatory multi-hour DR test was conducted at the CTC in order to fulfill contractual terms. “We use this time to train our critical facilities engineers on the gear operation. It’s not every day we just pull the plug, but I’m confident we can day or night,” said Keyser.

“It’s particularly cool with the closed transition transfers we can initiate. Not even our most sensitive downstream equipment sees the change to generator and back.”

Unparalleled support

Cerner’s critical facilities team and ESSCO have a long-standing partnership dating back many years. ESSCO supports a comprehensive maintenance schedule that includes planned service on all of the generator sets and associated equipment, as well as 24-hour on-call support.

“After many years of project development, this critical data facility now has a state-of-the-art power infrastructure that blends new with well-maintained legacy equipment to provide multiple levels of redundancy,” said Jim Marks, sales and project manager at ESSCO for this project.

“We at Emergency Systems Service Company are proud and honored to have been the chosen provider and to have earned the trust and relationship with the critical Malvern CTC team, Lane Keyser, George Hockman, Steve Grzywacz and Mark Rehner,” said Bob Hafich, president of sales and administration at ESSCO. “They are an extremely professional group to work with and we were also fortunate to have the opportunity to work with Craig Tupper from Union Electric and the Electrical Engineer Joe Stillman with Sharpe Engineering, who were first class as well. Working with people of this caliber is what made the project so successful.”