University Implements Smart Grid System to Minimize Power Outages

S&C Featured Solution: Self-Healing Grid

Location: Portales, New Mexico

Customer Challenge

Eastern New Mexico University (ENMU) is the state's largest regional comprehensive university, with three campuses and over 5,000 students. The 30 year-old 4160-V electrical distribution system at the Portales campus was an issue for the university's leadership . . . The overburdened system had experienced three major power outages over a four-year period, significantly impacting research labs, computer systems, classrooms, libraries, and dormitories. There was concern that any further occurrences might again result in the closure of part or all of the campus.

ENMU needed a solution that would immediately improve the reliability of the Portales campus electrical distribution system and meet its 21st-Century power needs. This solution needed to demonstrate the university's leadership in anticipating future energy requirements to students, parents, researchers, and academics.

S&C Solution

ENMU approached TME, Inc., an Arizona engineering services company, to consult with the university on what would be the best solution. Knowing the university wanted the highest level of power reliability, TME, Inc. collaborated with S&C Electric Company to engineer a state-of-the-art S&C High-Speed Fault-Clearing System at the Portales campus. The High-Speed Fault-Clearing System features S&C Remote Supervisory Vista® Underground Distribution Switchgear units that have been specially equipped with multifunction, microprocessor-based relays. These relays communicate with each other through a high-speed fiber-optic cable network. The High-Speed Fault-Clearing System is a closed-loop system that can isolate a main feeder fault in less than six cycles . . . or 0.1 seconds. If needed, the electrical distribution system can automatically transfer the loads to an alternate utility source — in a matter of seconds.

Before starting work, S&C developed a functional specification, detailing how the High-Speed Fault-Clearing System would operate during various fault scenarios and/or loss of a utility source. The functional specification provided the concept design for a new looped underground distribution system for the campus that would support the High-Speed Fault-Clearing System.

After the functional specification was approved, S&C proceeded to design a High-Speed Fault-Clearing System utilizing nine units of Remote Supervisory Vista Switchgear.

Installation of S&C Vista® Switchgear.

"S&C's High-Speed Fault-Clearing System has reduced the University's outages from days to seconds while giving us the ability to monitor and coordinate any repairs that are needed."

Eastern New Mexico University

The High-Speed Fault-Clearing System can isolate a main feeder fault in less than six cycles and, if needed, reroute power in seconds.

S&C's System VI™ Switchgear — which combines Vista Switchgear with low-voltage enclosures for utility revenue metering — would be applied at the two utility sources serving the campus.

In the event of a fault on the main feeder, the High-Speed Fault-Clearing System will isolate the fault and restore power in a fraction of a second. The main feeder is configured as a closed loop, which allows the automated Vista switchgear to quickly restore power if a fault occurs anywhere along the loop. The High-Speed Fault-Clearing System also features an innovative design that provides rapid power restoration in the event a fault disrupts service from the main utility source. In this event, the High-Speed Fault-Clearing System will automatically transfer the load to an alternate utility source. This automatic source transfer takes just seconds and provides another layer of protection against power outages. To assure that the relay settings and logic were correct, S&C's engineers also provided extensive factory acceptance testing of the High-Speed Fault-Clearing System at the company's Chicago, Illinois headquarters.

ENMU subsequently contracted with S&C to develop a Supervisory Control and Data Acquisition (SCADA) interface which would allow their facilities staff to check the status of the High-Speed Fault-Clearing System remotely and control it, if necessary. S&C engineered a web-based interface that can be securely viewed and operated from the personal computers of authorized individuals at the university. S&C trained university personnel on the operation and maintenance of the High-Speed Fault-Clearing System, as well as navigation of the SCADA interface.

Results

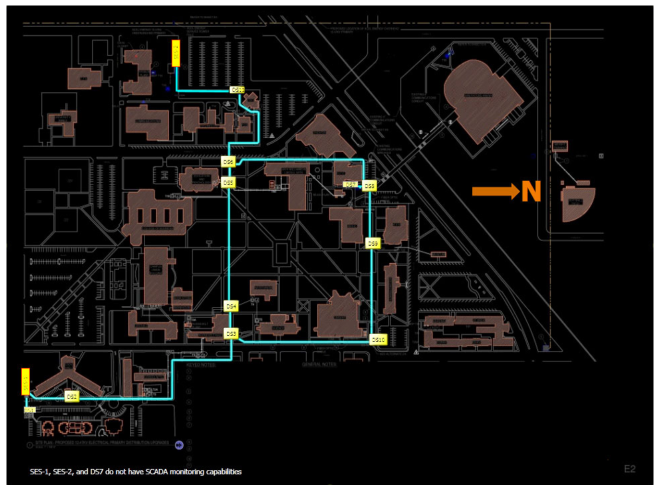
The High-Speed Fault-Clearing System was completed on time and within budget. The Portales campus now has a state-of-the-art, self-healing underground electrical distribution system that provides a very high level of reliability.

On-time completion of the project relied heavily on S&C's ability to furnish, install, and test the switchgear per a schedule that would minimize the need for planned outages on campus. The application of System VI Switchgear significantly reduced project costs by eliminating the requirement for additional metering switchgear at the two utility sources serving the campus.

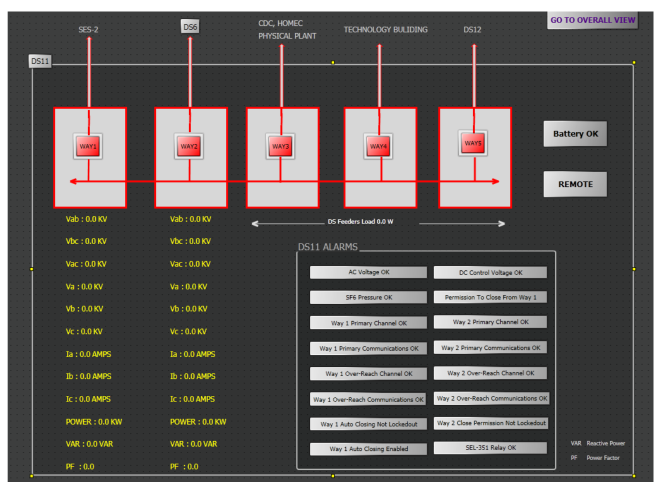
The SCADA interface for the High-Speed Fault-Clearing System has proven to be particularly useful for physical plant technicians at the Portales campus. When the system was first brought on line, the interface displayed fault alarms on the display screen.

Until the SCADA interface was implemented, the technicians were unaware that there was an issue requiring attention and maintenance.

Since the implementation of ENMU's self-healing underground electrical distribution system, there have been no power outages of the distribution loop at the Portales campus. Additionally, the upgraded power system is helping attract new students and researchers to the campus.



Outline of ENMU campus and S&C's High-Speed Fault-Clearing System.



SCADA HMI screens allowing monitoring and control of the HSFCS.

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