



Customer Needs Fast Maintenance on 300 Breakers

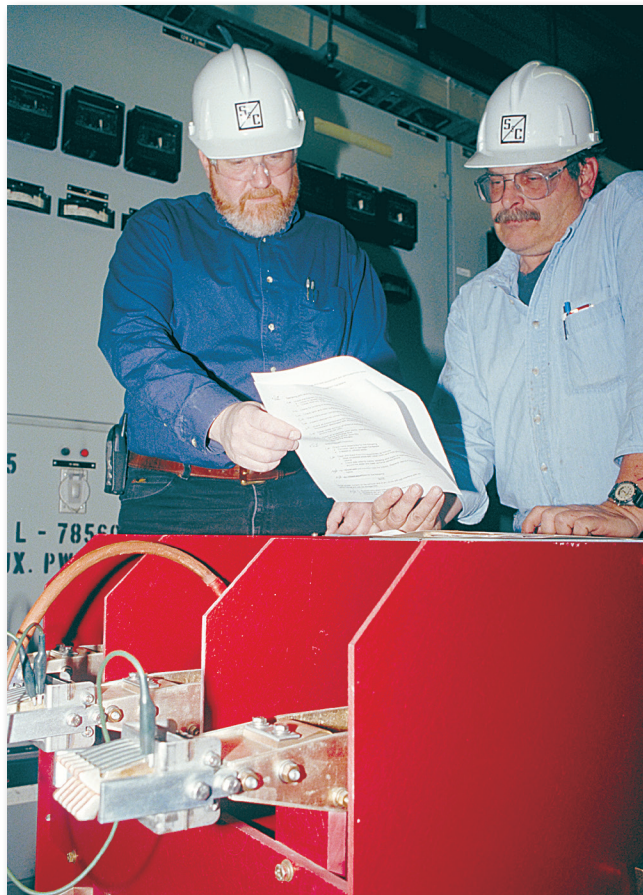
S&C Featured Solution: Turnkey Substation Breaker Maintenance Services

Location: Midwest United States

Customer Challenge

A large Midwestern utility had a number of high-priority projects targeted for completion prior to entering its peak-demand season. One of these was a maintenance and inspection project involving 300 medium-voltage circuit breakers at eight substations. This project was very high on the list as far as “summer-critical” projects because it was sure to impact system availability and reliability. But the utility had a severe resource shortage and thus needed to outsource this work for the first time in its history.

In late January 2000, the utility approached its alliance partner, S&C Electric Company, with a request to maintain and inspect the breakers. All installations had to be completed within a few months time! S&C agreed to accept the challenge.



Plans were immediately implemented to identify appropriate work teams, resource requirements, and the utility’s switching and operating procedures and safety and reporting requirements. Within a week, S&C had assembled the work teams and completed a trial maintenance and inspection procedure on a typical breaker, to ensure that everyone involved understood the scope of the work and the operating environment, as well as the site logistics. The utility gave the go-ahead to begin work immediately.

S&C Solution

S&C staffed the project with a dedicated project manager, five lead technicians, and a subcontracted group of union electricians divided into five crews. The subcontractor assigned a general foreman to work closely with the S&C project manager and to oversee the crews.

Some substations could only be serviced during specific times of the day due to demand and the utility’s elaborate switching routines. This meant that several of the crews reported to one substation in the morning to work on available breakers, then traveled to another substation in the afternoon to continue their day. This shifting of resources helped optimize workflow and efficiency of each crew.

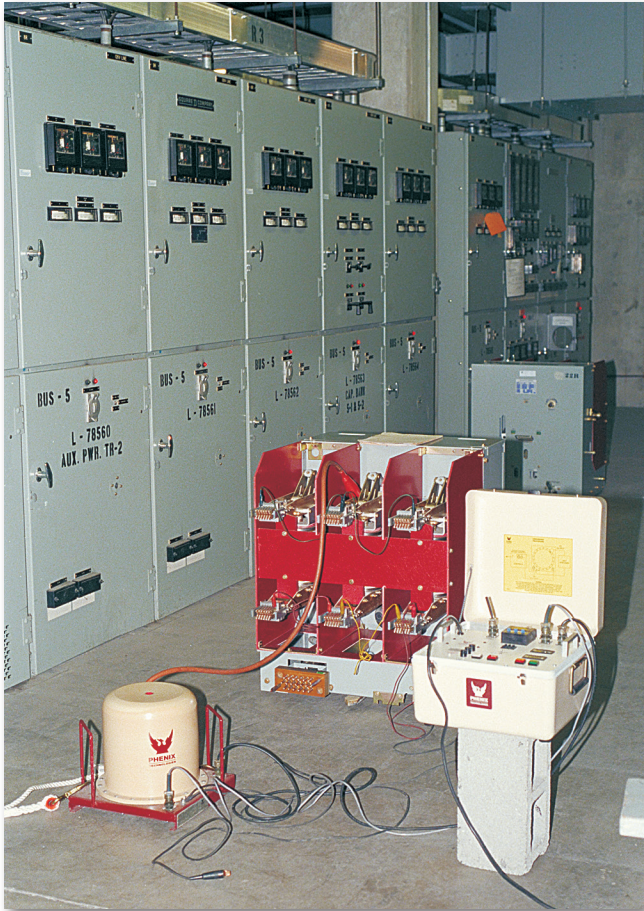
Each day began with a 15-minute safety meeting to review breaker operating, maintenance and testing procedures, as well as site logistical issues at each substation. Once a substation was switched-out by utility operating personnel, the S&C crews would immediately begin work on the breakers by removing front covers, arc chutes, and barriers. The following general tasks were carried out on each circuit breaker:

- Thorough visual and mechanical inspection of the circuit-breaker operating mechanism, racking mechanism, pole-units, primary- and secondary-contact assemblies, ground shoes, arc chutes, puffers, and wiring
- Thorough cleaning and lubrication of all mechanisms, stab-on assemblies, and conductors



- Thorough mechanical exercising of the circuit breaker as well as electrical operation via the circuit-breaker test stations
- Electrical testing, including insulation resistance, contact resistance, continuity of control circuits, and over-potential (vacuum circuit breakers only)
- Completion of an extensive circuit-breaker maintenance report for each unit
- Update of the utility maintenance database information, including work order numbers, asset numbers, and asset disposition

Minor repairs or adjustments were performed as needed and noted in the circuit-breaker maintenance report and database. When repair parts were required, the S&C project manager initiated a search within the utility's inventory system. If the part was not available in the utility's inventory, the project manager sought the part through outside OEM and surplus channels. This included special machining of a standard part in one case, and air freighting a part from Texas in another.



As the work progressed and smaller substations were completed, the size of the work force was adjusted to keep the per-unit cost as consistent as possible. This was accomplished through solid cooperation between S&C, its subcontractor, and utility personnel.

Results

Over 300 medium-voltage, metal-clad switchgear, air, and vacuum circuit breakers were serviced at eight different substations. They included 1950s- and 1960's-vintage G.E. MagneBlast; 1960s Allis-Chalmers MC & FC, 1960s I-T-E 15HK, 1970s Westinghouse DH & DHP, and 1980s Square D VAD circuit breakers.

The project scope was later expanded to include maintenance on reactors as well.

All circuit breakers and reactors were serviced and tested in accordance with the utility's guidelines and ANSI, IEEE, NFPA, and OSHA standards. Full preventive maintenance documentation was furnished for each breaker and reactor and the customer's maintenance database was updated on a daily basis. S&C personnel made many minor repairs and adjustments. Major repair or rebuild requirements were identified on a daily basis, and recommendations were made for repairing or reconditioning these circuit breakers and reactors.

The customer expressed the desire to continue to outsource their preventive maintenance program and is considering S&C's suggestion to test and calibrate all protective relaying associated with each breaker outage.

The bottom line: The utility was able to meet their maintenance goals in the time frame required.