



Case Study 4: Voltage Monitoring and Auto-Sectionalizing

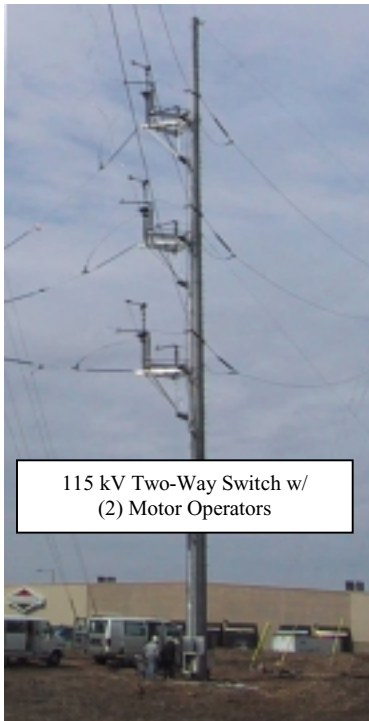


Figure 1

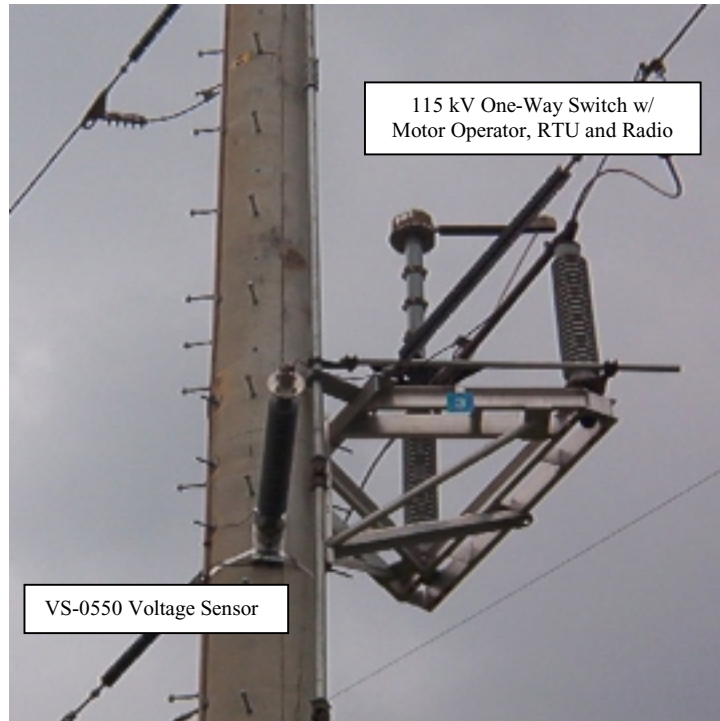


Figure 2

Customer: Investor Owned Utility

Location: Southeast U.S.

Problem Definition: A new large industrial customer is locating within a business park served by the Utility. Because line faults and other service interruptions to this customer can cause damage to plant equipment and adversely impact manufacturing operations the Utility was required to upgrade the existing 115 kV radial feed to a loop feed.

Business Objective(s): Improve system reliability. Reduce customer outage time, installation cost and space requirements.

Primary functional requirements of this project were to include: (1) a means to remotely switch in or out (close or open) both primary and secondary sources, (2) monitor and report actual voltage on both feeders, and (3) optionally, automatically switch in secondary source upon loss of potential on the primary source.

Other requirements included: (4) a single vendor solution to reduce coordination issues and to insure proper integration of all elements of the system; (5) delivery in 45 days (ARO) to meet the urgent time requirements of a highly compressed construction schedule.



Solution: To meet the customer's objectives SEECO provided an integrated solution, which included these major system components:

- (1) SEECO two-way 115 kV phase-over-phase switch with full load interrupter
- (1) SEECO one-way 115 kV phase-over-phase switch with full load interrupter
- (2) SEECO 115 kV voltage sensors
- (1) SEECO motor operator with integral power supply (batteries and charger)
- (2) SEECO motor operators without power supply
- (1) Quindar RTU (customer supplied)
- (1) Motorola radio (customer supplied)

To supplement the existing radial feed to the business park substation the Utility built a new 115 kV feeder line (diagram 1). The two-way switch was used at the tap point of the new feeder line and the tap line was then tied to the existing radial feed. The one-way switch was added to the existing radial line before the tie structure to provide a switching point to open or close the feed to the station. In this arrangement the original radial feed serves as the secondary source and the new feeder line serves as the primary.

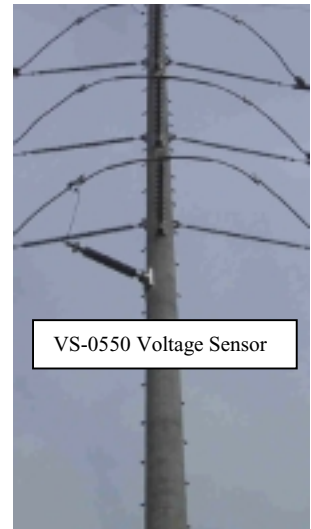


Figure 3

To provide load management capability and maximize switching flexibility each phase-over-phase switch was installed with SEECO full load interruption devices (Monoruptrs). Each interrupter provides the capability to open the associated one-way or two-way switch without service interruption when line maintenance or other sectionalizing is required and simplifies power transfer.

SEECO motor operators were installed on both the two-way and one-way switches providing a capability for remote control of all three ways. The motor operators provide a convenient platform for the integration of associated communication devices, such as the Quindar RTU, Motorola radio and the SEECO voltage sensor output unit. The one-way operator (figure 4) was used to house these devices as well as batteries, battery charger and an advanced battery management system. The other two operators utilized the station RTU and 48 VDC station service to provide control over the two-way switch on the new feeder line.

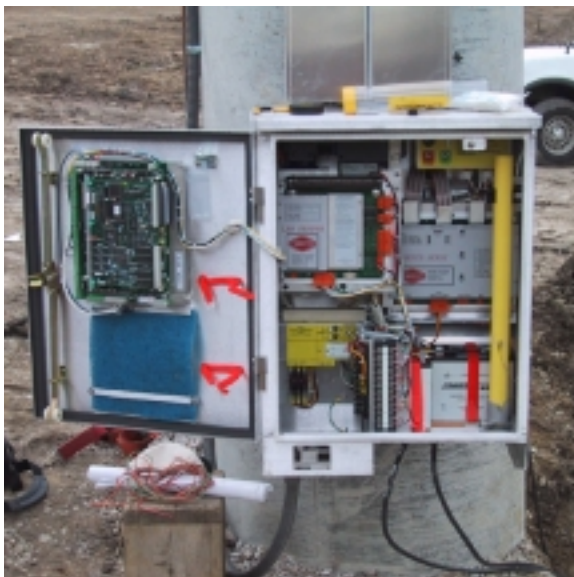


Figure 4

SEECO voltage sensors were also installed on both feeders. The voltage sensors are light weight, low cost devices that provide real time monitoring (data collection) of feeder voltage. They are the critical component that enables the overall auto-sectionalizing strategy, one of the key requirements for this project. One voltage sensor was installed on the pole structure supporting the one-way switch in the original radial line (figure 2) and the second voltage sensor was installed on a pole structure (figure 3) immediately adjacent to the two-way switch in the new line.

When used together as a single application, the above major components provide a remote capability for system operators to immediately recognize the loss of voltage on the primary source. System operators can then remotely open and close individual switches at their discretion to restore service through the secondary



source. Alternately, the supervisory control system can automatically open and close individual switches without the intervention of system operators to restore service upon loss of potential.

Implementation: The complete equipment package was delivered in early 2003 within the customer's required delivery window. SEECO engineering personnel were on hand to assist with installation, adjustment and training on all material supplied. Installation and adjustment activities for SEECO products took 3-4 days. Additional construction activity on the new feeder line continued for several more weeks with the entire project completed and in service by the end of the first quarter.

Several significant benefits were recognized by the customer during this project. Typical installation-related problems were reduced particularly in the area of communication between devices (rtu, radio, sensor) through the single vendor strategy with SEECO acting as the integrator of all material. Overall installation time was also greatly reduced due in part to the high degree of factory pre-assembly.

Another major benefit recognized by the customer was the cost savings associated with the use of SEECO voltage sensors. This organizations' typical method of voltage monitoring was to utilize a conventional oil-filled PT with pedestal structure and concrete footer. The PT and structure were usually mounted at grade level and required a chain link fence for both security and public safety. Instead, mounting the SEECO voltage sensor direct to the pole without a supporting structure was simple, quick and resulted in significant cost savings and the elimination of a major safety and liability concern.

Conclusion: The Utility has been operating with the new voltage monitoring and auto-sectionalizing capabilities successfully for several months and is now considering additional locations where it can be utilized. Due to their enthusiasm for both the sensor and motor operator they are also actively seeking additional applications for these products in distribution and substation.

