

Airport Feeder Restoration

Challenge

Power for a large southern California airport is served by feeders from two different utility substations. Normally half of the load is carried by each feeder. When power from one feeder is lost, crews are sent out to switches located throughout the airport, to manually transfer load from the lost feeder to the feeder that is still energized. Due to the distance between switch locations, this process takes a considerable amount of time, during which some of the terminals are left without power.

Airport authority wanted to automate this process to minimize the amount of time to restore power to the terminals as well as the central utility heating and cooling plant. During certain periods of the day however, the total load of the airport exceeds the maximum capacity of each feeder, therefore a traditional automatic source transfer system was not an option. The airport decided on a Smart Grid solution that, in the event of a loss of a feeder, would automate the process of maximizing the use of the available capacity of the one remaining feeder, by transferring only as much of the load as that feeder was capable of serving. Also, the automated system would need to take into consideration the criticality of each of the loads, and restore power to the loads in order of priority.

Because the entire solution needed to be functional within an aggressive timeframe, they wanted a “plug & play” solution that would be fully assembled, programmed, and tested before shipment, so as to eliminate any onsite integration or implementation issues that might delay the completion of the project. They also wanted a system that could be installed by their high voltage electrical contractor, who did not have any special expertise in automation systems.



Automated multi-way switch with SEL 451 relays mounted in a side compartment.

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After a thorough investigation of their options, the airport authority selected G&W Electric's pre-engineered Lazer® Automation System, using G&W Electric SF6 padmounted switches with Schweitzer Engineering Laboratory's model SEL 451 relays and SEL 1102 central processing unit. Due to the proximity of the airport to the Pacific Ocean, the G&W Electric switches were an ideal solution as they are deadfront, with all live parts completely protected from the detrimental effects of the coastal air. The switch's maintenance-free construction was also a perfect match for the application, as the airport is a 24/7 operation, with no opportunities for any scheduled maintenance outages.

Each of the switches is equipped with an SEL 451 relay, which monitors three phase voltage and current flowing through the switches to the loads. The SEL 1102 central processing unit acts as the master control and is housed within one of the SEL 451 cabinets. Utilizing high speed Mirrored Bit communication, the SEL 451 relays transmit the voltage and current data to the SEL 1102 via fiberoptic cables. From this information, the SEL 1102 continuously calculates the total load of the system.

When one of the substation feeders is lost, the SEL 1102 sends instructions to the SEL 451 relays to operate the switches and restore power to as many of the critical loads as the remaining feeder can handle. The system is configured to perform this function in coordination with the upstream substation protective devices.

After loss of a feeder, the entire restoration process is completed in just a few seconds. In the event that manual operation of the switches is required, the relays are labeled and configured for quick and easy pushbutton operation by the airport facilities personnel.

The SEL 451 relays, in conjunction with the G&W Electric load side resettable vacuum interrupters, also provide overcurrent protection on all load side ways of the switches. The result is a complete Smart Grid system of automatic feeder restoration with load shedding, and load side overcurrent protection.

Solution

The airport chose the G&W Electric switches and SEL relays are known throughout the industry for their reliability and ease of operation and are time proven products. The Lazer system was completely assembled, programmed, and tested prior to shipment, greatly facilitating ease of installation by the airport's contractor. The system was tailored by G&W Electric to completely match the specific needs of the airport's application. Representatives from G&W Electric were onsite to commission and test the scheme, as well as to provide operations training. All of this contributed to the airport personnel's piece of mind throughout the project.



The SEL 1102 central processing unit is mounted within one of the SEL 451 relay cabinets on the side of the switch.



Large, clearly labeled pushbuttons provide an easy way for facilities personnel to operate individual switches safely and with confidence.