Success story

Critical switchgear requires critical spares & expert service personnel

Background
A large power plant in the Western United States utilized a service organization to maintain its high voltage circuit breakers that were unfamiliar with high voltage switchgear. On the weekend of July 4th, 2013, the power plant was shut down just as the power grid was about to be stressed during the long, hot holiday weekend. A circuit breaker failed to trip because the mechanism could not build up energy. This led to an arrester failure followed by a transformer bushing explosion. Fortunately, a circuit breaker further down the line cleared the fault before additional collateral damage was done.

ABB Response
ABB received an emergency call at midnight that a critical circuit breaker had failed. A service engineer was immediately dispatched to diagnose and fix the problem. The service organization the power plant hired to maintain the switchgear thought the mechanism was working properly when in fact it had no spring charge at all. Upon external inspection, ABB’s service engineer instantly recognized the mechanism problem. After removing the mechanism cover, it was discovered that no maintenance had been done since the circuit breaker was installed 24 years ago. The motor brushes were worn down to the point where they could not make contact with the motor commutator. The motor could not run to recharge the mechanism putting the breaker in lockout condition. The breaker has supervisory features and alarms to warn personnel of this type of condition but they were not being monitored by plant operating personnel.

A $100 part was now resulting in $100,000 of lost revenue per day! As no spare parts were kept on stock and an incorrect failure diagnosis had been given over the phone, the service engineer did not bring the appropriate parts to the site to repair the breaker. However, with his extensive training and experience, he was able to create a temporary fix which allowed the mechanism to recharge and open the circuit breaker.

Due to the criticality of keeping the breaker operating, the power plant’s service organization searched nearby facilities for an exact replacement part on an existing circuit breaker and were lucky enough to find one. It was swapped before the breaker closed again and caused another outage.

Before leaving, the service engineer explained ABB’s process for ordering [critical] spare parts (which were summarily delivered via early AM courier. He also recommended what maintenance on the mechanism (oil change and overhaul with AHMA upgrade kit: o-rings, gears, pins) and circuit breaker (10 year overhaul) would life extend and improve the equipment’s reliability.

Facts

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<tr>
<th>Country</th>
<th>Western USA</th>
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<tr>
<td>Customer</td>
<td>Power plant</td>
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<tr>
<td>Scope of supply</td>
<td>Critical spare parts, emergency response, expert field service personnel</td>
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<tr>
<td>Year of product delivery</td>
<td>1989, 121 kV PA circuit breaker</td>
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<tr>
<td>Year of service event</td>
<td>2013, summer holiday weekend</td>
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Top picture: motor brush worn to critical point. The clip¹ is depressed into brush holder² against the wire. An open circuit was inevitable.

Bottom picture: New brushes³ on a similar mechanism. Notice how the motor commutator⁴ is evenly worn and the brush has at least 1/4 inch of clearance above brush holder². See brush replacement guide, page 2.
Customer benefits

ABB High Voltage Service is NAM's largest & leading aftermarket support service organization:
- ABB supplies spare parts specific to each breaker serial number ensuring form, fit, and function
- ABB stocks over $20 million of inventory in current production & legacy switchgear parts
- Field service engineers receive extensive training every year
- Field service engineers are strategically located to ensure rapid response to emergency events
- Many service engineers are garner specific expertise in specific areas such as dedicated product lines, mechanisms, SF₆ gas, radiography, et cetera.

Motor brush replacement guide
1 New brush
2 3/4 life
3 1/2 life / replacement stage
4 Critical / failure stage

Comparision: Stocking parts vs. risking an outage

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<th>Stocked Parts</th>
<th>Parts &amp; Expediting</th>
<th>Emergency Service Call</th>
<th>Lost revenue from power plant outage</th>
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