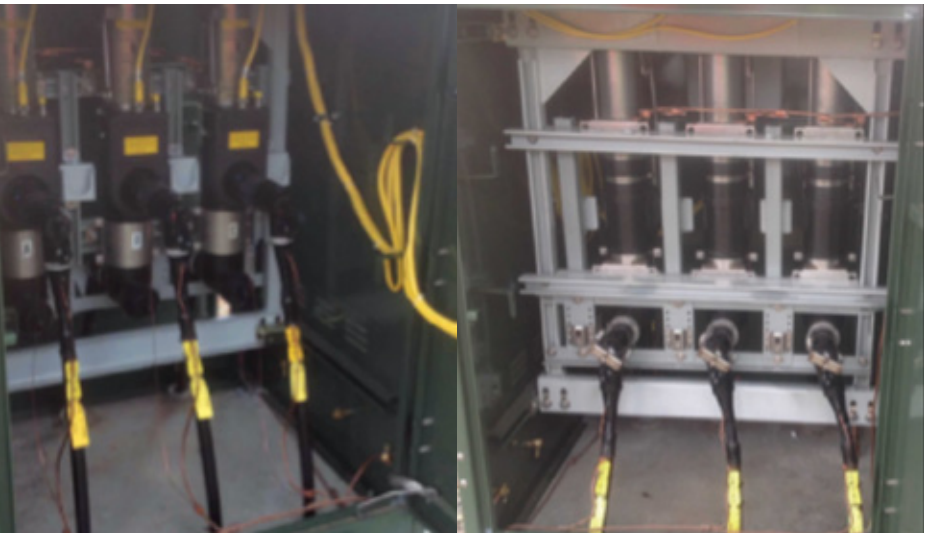
CASE STUDY

elastimold®

Air-insulated switchgear conversion is “plug-and-play”



Elastimold MVI interrupters provided a dead-front and shielded solution that does not rely on oil, gas or air for insulation or interruption, resulting in long-life, maintenance-free* operation.

Background

A large, West Coast investor-owned utility made the decision to transition from their use of air-insulated, live-front, fusible switchgear in certain applications to solid dielectric, deadfront switchgear with re-settable vacuum fault interrupters. Motivation for the change was primarily centered around the safety attributes associated with dead-front switchgear construction and the containment of any arcing activity associated with current interruption to within an encapsulated vacuum interrupter bottle.

The customer requested that the physical layout of the replacement switchgear offer a “plug-and-play” installation. Such a solution would save on retrofit costs and minimize outage durations under routine and emergency replacement conditions.

Having had some experience with Elastimold molded vacuum switchgear in both padmount and vault-type installations, the utility was comfortable with the technology and appreciated the modularity of the components. They expressed confidence that the Elastimold modular concept could be used to achieve designs to match their plug-and-play goal over any other possible solution on the market.

During initial meetings between the utility and the ABB sales agent, the challenge to design a replacement for an existing double-side access padmount switchgear unit containing three air-insulated power fuse mountings was identified.

Ideally, the solution would:

- Incorporate an enclosure compatible with the existing switchgear pad
- Match the existing cable projection locations
- Locate bushing heights to allow re-termination of the existing cables without the need to splice or pull new cable
- Offer the ability to pull and park the cables on stand-off bushings
- Duplicate the existing protection time current characteristics (TCC)
- Provide a single part number to retrofit both 15 and 25 kV installations

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01 Prototype as received
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02 Design optimization in progress
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03 Parking stand placement

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Solution

After much collaboration between the utility's standards team and ABB sales, product engineering and application engineering, a design approach was determined. A prototype unit was manufactured and shipped to the customer for evaluation and design refinement.

The prototype was equipped with three single-phase molded vacuum interrupters (MVIs) with an Elastimold type 380 self-powered, programmable, electronic overcurrent control (figure 1). The control was loaded with a library of standard fuse and relay TCC curves, including curves that emulate the existing power fuses. The design included the ability to adjust the MVI positions both horizontally and vertically to match the existing cable termination heights and spacing, as well as front-to-back for the best alignment over the existing cable conduits. The switchgear enclosure was sized to fit over the 25 kV standard conduit layouts while not exceeding the 15 kV pad dimensions.

The customer laid out their existing 15 and 25 kV pad dimensions and conduit locations on a single pallet to help visualize the requirements and reveal where leeway might exist. With the switchgear placed on the pallet, it became apparent that a smaller cabinet would fit better on the 15 kV pads while still allowing coverage of the 25 kV conduits. Additionally, it was clear that existing cable termination heights would be better matched with the MVIs rotated 180° from the prototype orientation (figure 2). Other minor details such as parking stand placement (figure 3) and grounding provisions were worked out as well.

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04 Trial installation site
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05 Line side re-terminated
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06 Load side re-terminated

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04

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05

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06

Results

The prototype unit was re-worked to incorporate the improvements identified during the evaluation process. Meanwhile, the utility designated a location for a trial installation that would test the boundaries of the plug-and-play concept.

The existing air-insulated switchgear was removed (figure 4) and the Elastimold switchgear was lowered into place. There was plenty of existing cable available on both sides of the gear to allow re-termination without the need to pull or splice new cable. In fact, the existing semi-con cut-backs did not need to be altered on either side of the switchgear. Elbows were installed on the line- and load-side cables (figures 5 and 6) without incident.

All involved agreed the installation was a resounding success and that every plug-and-play objective stated at the outset had been achieved. Additionally, the Elastimold MVI interrupters provided a dead-front and shielded solution that does not rely on oil, gas, or air for insulation or interruption resulting in long-life, maintenance-free* operation.

* Elastimold switchgear is considered maintenance-free because its enclosed arc-dampening chamber contains no oil or gas to monitor or maintain.

US
ABB Installation Products Inc.
Electrification business
860 Ridge Lake Blvd.
Memphis, TN 38120
+1 901-252-5000

tnb.abb.com

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