CASE STUDY

Elastimold® underground switchgear sectionalizing conversion: From air-insulated to solid-dielectric

Industry: Electric utility

Challenge: Frequent service disruptions due to failures of a 3-way air-insulated fused switchgear

Product solution: Elastimold solid-dielectric switchgear

Abstract
For an electric utility, having a reliable electric system is critical. Pedernales Electric Cooperative (PEC), a large electrical cooperative in central Texas, was experiencing interruptions in service due to failures of their 3-way air-insulated fused switchgear (see figures 1 and 2). These failures were primarily attributed to tracking of the insulators to the enclosure of the switchgear, resulting in multiple outages. PEC determined that an alternative solution to replace their air-insulated fused switchgear was needed. However, there were two challenges that made it difficult for PEC to find an alternative solution using a typical switchgear:

1. The need to accommodate the existing cable entrance/exit locations.
2. Their preference to retain the existing enclosure to match the existing footprint.

Solution
ABB Installation Products provided a solution based on Elastimold molded vacuum interrupters (MVIs) and molded vacuum switches (MVSs), which are the essential building blocks of Elastimold switchgear (see figures 3 and 4).

The dead-front, solid-dielectric design of the MVS and MVI helps to eliminate the tracking that was being experienced by the air-insulated switch in the existing switchgear. Technologies such as solid-dielectric insulation and a patented silicon rubber diaphragm inside the MVS and MVI help reduce the overall size, which aids in retrofitting the switchgear into an existing enclosure.

To account for replacement of fuses with specific time-current characteristic (TCC) curves, the MVIs are paired with an Elastimold 380 control, which provides overcurrent protection that is set with programmable TCC curves. An added functionality with this control is its use in sectionalizing applications.

—
01

—
02

—
03

—
01 Front of existing air-insulated switchgear
—
02 Rear of existing air-insulated switchgear
—
03 Assembled Elastimold solid-dielectric switchgear
—
04 Three-phase and single-phase Elastimold MVIs
—
05 Three-phase and single-phase Elastimold MVSs

Furthermore, these devices are available with a combination of different ANSI IEEE 386 underground interfaces such as:

- 200 amp bushing well interface
- 600 amp apparatus bushing interface
- 600 amp T-body interface

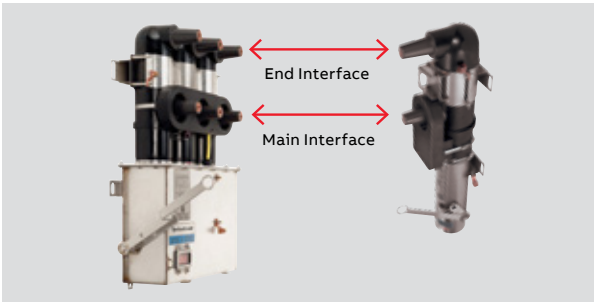
Since these devices are not position-sensitive, the MVIs and MVSs with a 600 amp T-body end interface can be installed directly onto multi-point junctions with 600 amp apparatus bushing interfaces.

Implementing the solution

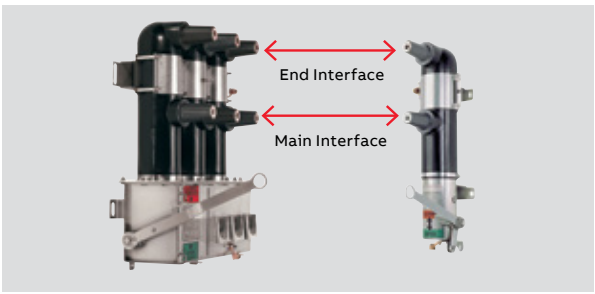
After defining the desired configuration, PEC removed all the existing internal components of their switchgear and built up a new dead-front, solid-dielectric switchgear in the existing enclosure using the following components (see figure 5):

- (3) Three-point junctions with 600 amp apparatus bushings
- (3) MVIs with 600 amp T-body for the end interface and 200 amp bushing well for the main interface, equipped with an Elastimold 380 control
- (6) MVSs with 600 amp T-body for the end interface and 600 amp apparatus bushing for the main interface
- Metal strut frames and hardware

The three 3-point junctions were employed to replicate the same number of ways configured in the existing air-insulated gear. Installing MVSs on the outer part of the junctions allowed PEC to configure the assembly for loop-feed operation with other switchgear in the loop, while also allowing the flexibility to isolate the cabinet. When needed, each MVS can be opened or closed by simply operating the manual handle using a hot stick. The MVIs in the center position of each 3-point junction protect against overcurrent events and will trip based on the programmed TCC curves. In addition, the MVIs can be used to isolate the load by opening the vacuum contacts via the manual operating handle.



—
04



—
05

—
06

—
07

—
06 Front side of existing cabinet after retrofit with Elastimold switchgear
—
07 Back side of existing cabinet after retrofit with Elastimold 380 control mounted

Conclusion

ABB Installation Products' Elastimold switchgear fully met PEC's retrofit requirements (see figures 6 and 7). The compact size of the MVIs and MVSs allowed for a clean installation into the existing enclosure, which helped reduce the overall retrofit cost and rework. Furthermore, by utilizing the MVSs, MVIs and 380 control, PEC has benefited from the following additional functionality of Elastimold solid-dielectric switchgear over the originally installed air-insulated fused switchgear:

- The solid-dielectric dead-front design with vacuum technology decreases the likelihood of any internal flashovers compared to air-insulated switchgear since there is no exposure to live components.
- The MVIs with 380 control come preloaded with 40 industry-standard TCC curves and allow users to modify these preloaded curves or create their own. This helps increase flexibility when coordinating with upstream and downstream devices.
- The MVIs with 380 control eliminate the need to stock replacement fuses, because the single-phase MVI is field-resettable using a hot stick.
- The MVIs with 380 control allow for selectable single- or three-phase tripping, which can minimize the impact of single-phase faults, increasing overall system reliability.

Overall, PEC was satisfied, not only with the Elastimold solid-dielectric switchgear design and functionality, but also with the application flexibility of the modular, field-configurable concept. Since completion of the initial retrofit project, PEC has installed Elastimold switchgear throughout central Texas.

—
ABB Installation Products Inc.
Electrification business
860 Ridge Lake Blvd.
Memphis, TN 38120

Customer Service: 800-816-7809

solutions.abb/cable-accessories-apparatus

7TKK000549 5.2019