CASE STUDY
IMPROVING RELIABILITY

S&C ELECTRIC COMPANY
Excellence Through Innovation

Cypoxy™ Insulators… Key to Developing a Distribution Automation Switch

S&C Featured Solution: Scada-Mate®Switching System

Location: Chicago, Illinois, United States

Customer Challenge

Ten years ago, S&C introduced the Scada-Mate Switching System, an entirely new concept for overhead distribution automation embodying sensing, control, and communications in one economical, self-contained integrated package.

Early on in the development of this device, it was seen that breakthrough designs would be needed—especially for the interrupters and sensors.

Several big challenges presented themselves immediately. The new device would need to be capable of much more frequent operation than conventional switches. Achieving such performance would require the use of SF_6 technology. S&C had 30 years of experience applying this interrupting medium in its Mark V and Series 2000 Circuit-Switcher interrupters for transmission-voltage applications. But an automated distribution switch would require a totally new interrupter concept.

The housing for the interrupter would have to provide adequate insulation across the open gap of the switch, as well as insulation from line to ground. The switch would also need to have an integral visible disconnect. Such requirements eliminated a dead-tank, single-housing design.

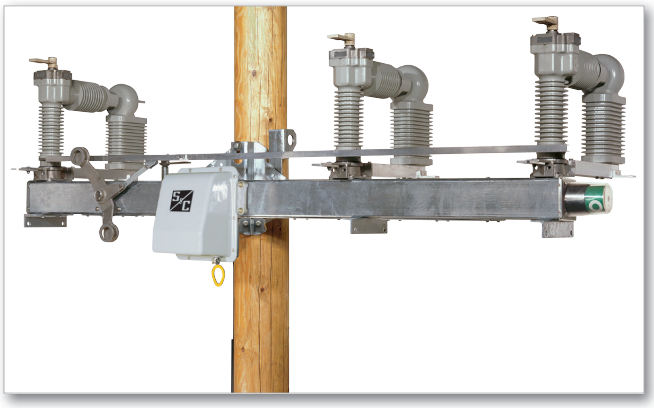
The simplest way to satisfy the insulation requirements for the switch and achieve the visible disconnect was seen to be a rotatable interrupter. Such an arrangement could have been developed using a porcelain housing with aluminum end-castings. But the assembly would have required numerous seals to contain the SF_6 gas, presenting reliability issues as well as extensive material and labor costs.

S&C Solution

The Cypoxy™ Insulator, S&C's cycloaliphatic epoxy resin system, provided the ideal solution. It meets or exceeds all industry-standard electrical and mechanical strength requirements for insulation applied at 14.4 kV through 34.5 kV.

Cypoxy Insulators had been extensively used by S&C in a variety of switch components, including apparatus and specialty insulators, pushrods, and struts. Its performance had been field-proven. Cypoxy Insulators installed in an outdoor California seacoast facility have remained in excellent condition for 30 years with virtually no surface erosion or evidence of tracking. Similar results have been achieved in accelerated environmental tests, simulating 40 years of exposure in the humid climate of Atlanta, Georgia.

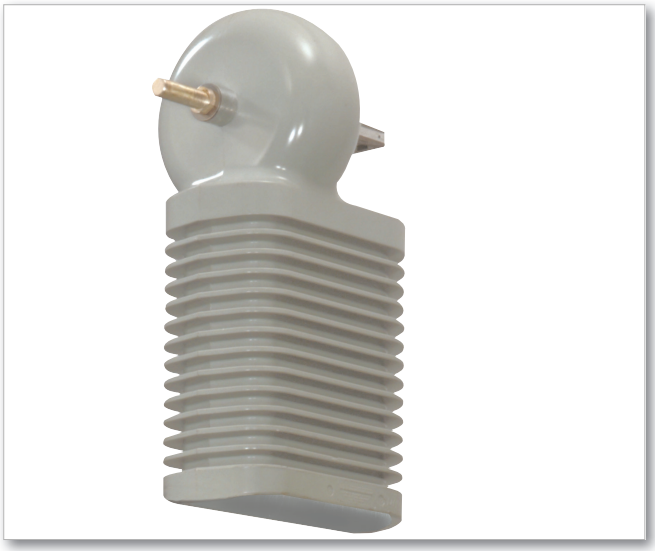
In addition to providing superb insulating properties, the cycloaliphatic epoxy resin can be molded into almost any shape, with metal inserts incorporated during the molding process. In fact, the resin's versatility permitted the entire interrupter housing to be molded in a single piece, along with all the inserts necessary to support functional parts. And, using

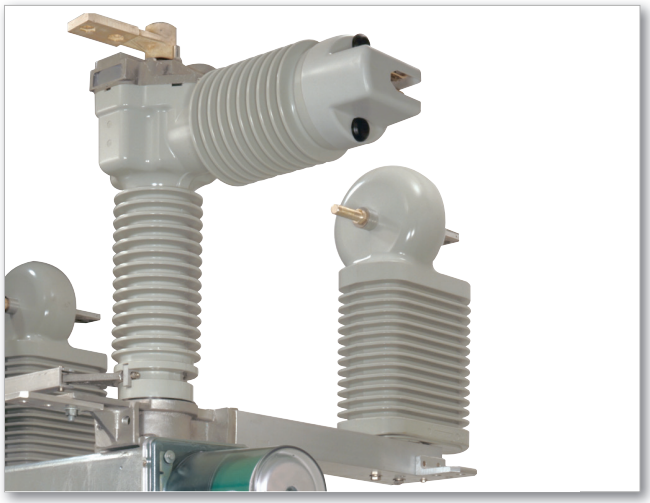


the cycloaliphatic epoxy resin system, the voltage and current sensors needed to provide information for automated switching can be molded in their own encapsulated assemblies.

S&C's designers decided to use a continuous "L"-shaped mold for the interrupter housing. The vertical portion contains the high-speed linkage for operating the switch contacts and provides line-to-ground insulation. The horizontal portion incorporates the components required for circuit closing and opening. To create the visible air gap, the interrupter rotates away from its closed position. The housing was designed with the minimum number of gas seals.

Each design refinement was followed by extensive testing. Switches were subjected to numerous electrical, thermal cycling, and thermal shock tests. Considerable development time was saved through use of S&C's large on-site testing laboratory.





Results

Scada-Mate Switching Systems have been well received by the electric utility industry and today provide excellent service in tens of thousands of installations. And Cypoxy Insulators, a crucial element in its development, has gone on to provide uncompromising performance in millions of applications worldwide.

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