CASE STUDY
IMPROVING RELIABILITY

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Inventor Turns to S&C to Perform Temperature-Rise Testing on a Prototype Circuit Bypass Tool

S&C Featured Solution: Laboratory testing

Location: Montana, United States

Customer Challenge

Larski Corporation recently asked S&C's Power Systems Solutions division to perform laboratory testing on a prototype of their Jack Jumper Cutout Bypass Tool. This tool was developed to provide a convenient means for temporarily bypassing a fuse tube or disconnect blade prior to its removal from the cutout, thus eliminating a power outage to the load served from the cutout.

S&C Solution

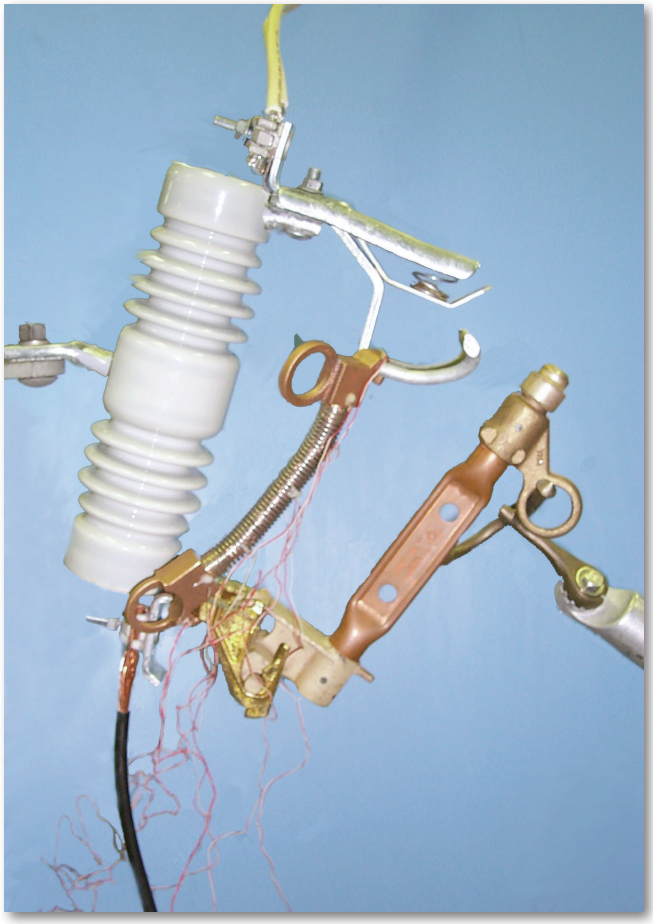
The purpose of the testing was to verify the test sample could continuously carry 100 amperes of load current without exceeding the allowable 40°C (104°F) temperature rise permitted by IEEE Standards.

Prior to testing, dc resistance measurements were taken at several points on the tool; these measurements were repeated after the testing was completed.

Seven thermocouples were cemented to the tool at various locations from the upper ferrule to the lower ferrule to monitor temperature. The tool was then positioned across Loadbuster®–The S&C Loadbreak Tool attachment hook and hinge of a 15-kV cutout mounting fitted with a disconnect blade.

After energizing the circuit, the disconnect blade was removed from the mounting, and temperature readings from the thermocouples were recorded. The initial test current of 40 amperes was maintained until temperature-rise stabilization occurred, as defined per IEEE Standard C37.4, i.e., until three successive half-hour temperature-rise readings were stable within 1°C at each location. After temperature-rise stabilization occurred, the current was increased by an appropriate increment. This current was again maintained until temperature-rise stabilization occurred. This process was repeated until a maximum temperature rise of approximately 40°C was achieved.

Additional testing was performed to determine the capability of the tool at higher currents and for shorter durations.



Results

Six current levels of 40, 60, 80, 100, 140, and 150 amperes were applied to the sample and temperature readings recorded every 10 minutes. An additional test was conducted at 200 amperes to determine how long the tool could conduct this current without exceeding a 40°C rise. Readings during the 200-ampere test were recorded every minute.

It was found that the test sample performed well at currents in excess of 100 amperes. At 140 amperes, the tool experienced a maximum temperature rise of 39°C (102°F). At 150 amperes, it slightly exceeded the maximum allowable temperature rise. At 200 amperes, the temperature rise remained below 40°C for approximately 10 minutes.

Since completion of S&C's testing, the bypass tool has been approved for use at over 60 electric utilities throughout the US. In addition, Larski Corporation has turned to S&C to perform similar testing on a prototype of their 25-kV Jack Jumper.