Customer Success Story:
Gas Pipe Line Booster Stations

Market segment
Oil and Gas

Eaton Medium Voltage Vacuum Starter Replacements generate huge savings for pipe line

Location:
Alpharetta, GA

Challenge:
The pipeline wanted increased switching operations, reduced maintenance costs, and lower chop currents.

Solution:
Eaton replaced DH and DHP power circuit breakers with MV-VSR.

Results:
Design life of 250,000 full load switching operations with little or no maintenance and extended time between scheduled maintenance outages was achieved. Chop currents were also reduced from 5 amps to .3 amps.

Background

Oil and gas pipelines traditionally use power circuit breakers for frequent switching of large AC induction motors. These motors control the flow of gas in the pipe lines and are a critical element to efficient and reliable operation. Most are operated at 4 kV.

However, power circuit breakers are not designed for use as motor starters. Repetitive switching of inductive loads creates higher stresses on the mechanism components as compared to resistive switching. IEEE Standard Rating Structure for power circuit breakers, C37.06, indicates a reduced switching duty requirement for these applications. The reduced duty and higher mechanism stress requires increased maintenance to be done on a more frequent schedule. There are many mechanism choices and some may provide more operations and longer intervals between scheduled maintenance. Medium voltage (MV) Power circuit breakers generate chop currents as high as 10 amps during arc interruption. Chop currents create transient over-voltages that can damage the end-turns of motor winding insulation and eventually cause failures.

Challenge

Replacing existing power circuit breakers with MV motor control is a great solution which provides more switching operations, extends the time between scheduled maintenance outages, and reduces chop currents to levels as low as .3 Amps. However, this approach is expensive due to the costs of removal of existing switchgear, site preparation and replacement of existing cables. This also requires lengthy outages. Large pipelines can spend upwards of $100K/year on breaker repairs. Production losses of $10K-$40K/hour are even more costly. This equates to an average of $1million/year for repairs and lost production.

Solution

Eaton's Power Breaker Center worked closely with the pipeline for almost two years to produce fused vacuum contactor devices for the pipeline's MV power circuit breakers. The devices are called medium voltage vacuum starter replacements (MV-VSR). The MV-VSR physically fits into the cell and has interfaces and interlocks to allow it to provide characteristics similar to a power circuit breaker.

Results

A mixture of 50DH-VSR and 50DHP-VSR designs replaced their MV breakers. This should save the pipeline approximately $1M/year in repairs and lost production costs.

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