Case Study: Natural Gas Sweetening Plant

"Lineator provided the perfect power quality solution for our generator-fed MCC arrangements."
- Dave Challoner

Scenario

A natural gas processing and transportation company, located in British Columbia, Canada, had commissioned the installation of 8 Motor Control Centers (MCC's), each exclusively loaded with adjustable frequency drives, for an upgrade at one of their natural gas sweetening plants. Since the plant power supply is entirely fed by on-site turbine generators, the heavy concentration of drives raised significant concern about harmonics and their effect on power quality.

To process sour natural gas for safe transport, poisonous hydrogen sulfide (H_2S) must be removed. The process trains at the plant use an aqueous amine solution to absorb the H_2S. The liquid requires a carefully controlled temperature, which is regulated with cooling fans. The MCC's each contained seven 480V adjustable frequency drives (1x40hp, 4x50hp, 2x60hp), running a configuration of fans to control temperature in the amine trains. This critical process demanded high reliability and stability in power quality which could not be assured by using standard methods of harmonic reduction, such as line reactors, especially with the high impedance generator source. 12- and 18- pulse solutions were not practical due to the cost of the technology on each of the small drives. Tuned filters posed a risk as knowledge of harmonics from the rest of the power system were difficult to calculate making it all but impossible to determine proper sizing. There was also uncertainty about the long-term reliability of active filter solutions.

Solution

Dave Challoner, the engineer managing the project, turned to the **LINEATOR™** Universal Harmonic Filter from Mirus International Inc. upon recommendations from the drive supplier. *"**LINEATOR™** offered premium harmonic attenuation, a reliable passive filter design, and system independency,"* remarked Dave.

*The ability to apply one **LINEATOR™** to each MCC also made it cost effective and easy to install."*

The installation of the **LINEATOR™** was a tremendous success. Without correction devices, Total Harmonic Voltage Distortion on the 480V switchgear supplying the 8 amine train MCC's was expected to exceed 16.5%, with Current Distortion as high as 40%. The **LINEATOR™** proposed to bring Voltage Distortion below 5% and Current Distortion below 8%. Actual performance exceeded both predicted levels, with voltage and current distortion measured at 1.9% and 5.7% respectively while running at near full load, well below the project target and IEEE 519 guidelines.

Benefits

LINEATOR™ proved to be the right solution for this installation, because:

- The **LINEATOR™** was system independent and did not require valuable engineering time spent evaluating exact fault levels and harmonics on the rest of the power distribution system
- Installation of a single **LINEATOR™** on multiple drives (in this case, an MCC line-up) was simple, space-saving, and relatively economical
- The simple yet robust **LINEATOR™** filter design was considered to be inherently more reliable than a complex electronic active-filter system
- The measured performance of the **LINEATOR™** exceeded expectations

Summary

Resolving the potential harmonic problems with the generator-fed MCC application of drives was a real challenge. **LINEATOR™** delivered, solving the installation and power quality concerns reliably and cost-effectively.

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