CASE STUDY

Water Quality Control Plant
Turbo Blower Replacement Project

MIRUS International Inc.

Challenge

When the Cities of South San Francisco/San Bruno Water Quality Control Plant (WQCP) explored options to reduce energy consumption, they performed an energy audit to determine where it was best to focus their efforts for maximum benefits. This audit concluded that the aeration blowers consumed the largest amount of electrical power in the whole plant. Since California has one of the most aggressive environmental policies in the world and offers incentives to help reduce emissions, it made sense to replace their existing equipment. In doing so, they would realize a return on their investment through energy savings.

The WQCP decided to implement a new advanced aeration blower technology derived from Aerospace and Defense industries sourced from APG-Neuros, the recognized market leader in the supply of Air Turbo Blower systems to wastewater treatment plants in North America. The APG-Neuros Turbo blowers are at least 40% more efficient than conventional blower technologies and offer 50% of the footprint of conventional aeration blowers.

In addition to the power consumption targets, the project specification required harmonic filtering to reduce total current demand distortion, I_{TDD}, to less than 5% at the terminals of the blower package over the entire operating range. Based on this, APG-Neuros was faced with the task of meeting stringent harmonic reduction guidelines while maintaining their compact packaging solution without compromising energy efficiency performance.

The equipment selected by the WQCP was comprised of a 350 HP APG-Neuros Turbo Blower, a Variable Frequency Drive (VFD) and a Mirus Lineator™ AUHF Harmonic Filter in order to upgrade the existing aeration blowers and to reduce the energy consumption.

APG-Neuros Turbo Blower system with Mirus Lineator

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Solution

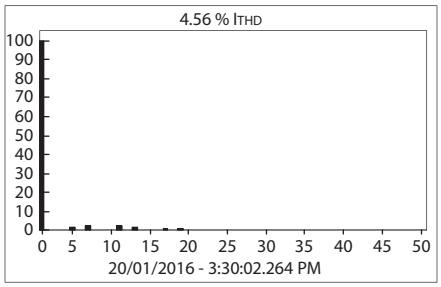
Power Quality Concepts, the Mirus International Representative who provided the harmonic mitigation expertise, had given the support necessary for APG-Neuros to run several harmonic simulation scenarios using SOLV™, Mirus' exclusive harmonic analysis software. The results from the simulation demonstrated that the Mirus Lineator™ HP model would meet and exceed the IEEE Standard 519 harmonic limits. The local consulting engineer who was familiar with the Mirus Lineator was satisfied with the simulation results but also requested that field measurement be conducted after the installation to confirm that all performance requirements were met.

The Mirus engineering team collaborated with APG-Neuros engineers and presented the ideal Lineator packaging that would easily fit within the Turbo Blower system enclosure.

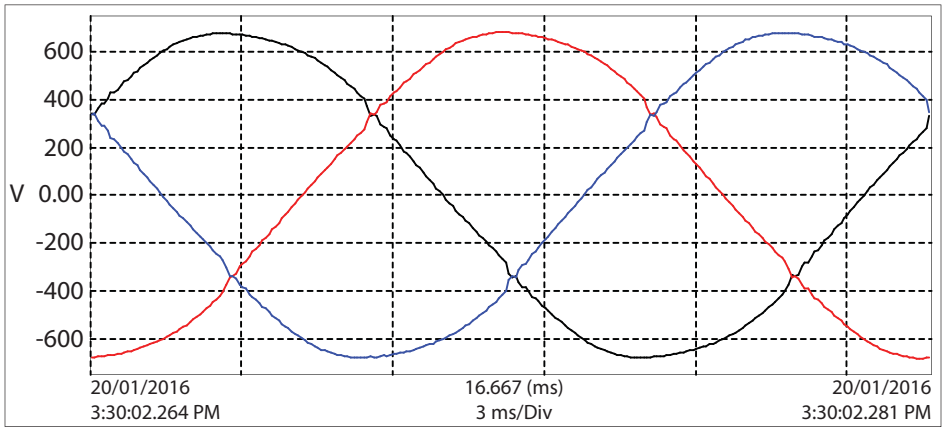
Results

The installation of the APG-Neuros Turbo Blower system equipped with the Lineator™ HP Harmonic Filter enabled the South San Francisco Water Quality Control Plant to fulfill their energy efficiency targets and meet the harmonic reduction guidelines specified by the local consulting engineer. The new system is estimated to have an annual energy savings of $55,000 with a payback period of less than 4 years.

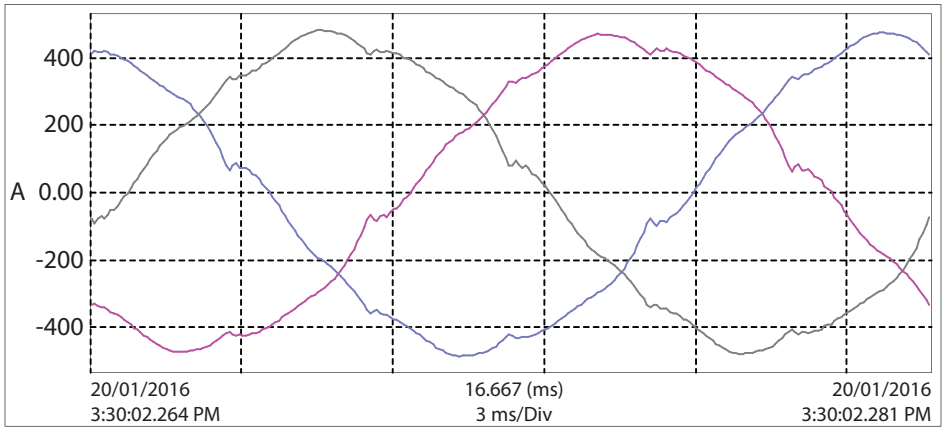
Field measurements were conducted at various load levels to demonstrate the operation and performance of the Lineator™. As the best passive harmonic filter for variable speed drives, the Lineator ™ AUHF did not disappoint. Total harmonic current distortion at full speed operation was only 4.56% which bettered the predicted SOLV computer simulation. I_{TDD} was comfortably below the required 5% over the entire operating range and voltage total harmonic distortion never exceeded 2.5%. The consulting engineer and the WQCP were both very satisfied with the results and were able to enjoy the energy saving benefits of the new turbo blower system with a harmonic mitigation solution that offered the highest efficiency of any option available on the market.



Current harmonics at full load operation



Voltage waveform at full load operation: V_{THD} = 2.15%



Current waveform at full load operation: I_{THD} = 4.56%

About Mirus International

Mirus designs and develops world class power quality improvement products for mission critical operations. Their uniquely specialize product line includes highly efficient harmonic filters, transformers, autotransformers and Data Center power distribution equipment. Comprised of a leading team of power quality experts, Mirus' solutions minimize disruption to the power supply, improve reliability and adhere to the strictest of regulatory requirements while also saving energy. Proven to perform, Mirus products are available globally and are real-world tested in its own Harmonics & Energy (H&E) Lab.