

CASE STUDY

The Bellagio Hotel & Casino Las Vegas, Nevada

Facility Description

Wynn Resorts Limited is a developer and operator of high-end hotels and casinos. Their Bellagio Hotel & Casino, which was opened in 1998, was later sold to the MGM Mirage Group.

Challenge

Prior to its opening in 1998, PQI was asked to investigate the cause of several serious operational problems. These problems included the corruption of data in the computer and gaming machine networks, and poor video quality at the security surveillance system monitors. Our investigation uncovered two significant power quality issues, which were the cause of these network and picture quality problems. The issues included very high levels of voltage distortion and neutral-to-ground voltage at these sensitive electronic loads. Power system and load incompatibility problems are common when the loads are nonlinear. PQI was next asked to find a solution, prepare a detailed proposal and guarantee the outcome.



Solution

Based on our proposal, PQI was authorized to supply small zero-sequence harmonic filters for all branch circuit sub-panels and phase-shifting harmonic mitigating autotransformers for all five targeted subsystems. The filters were used to shunt all load-generated zero-sequence harmonic currents near their sources. These devices reduced the worst-case neutral-to-ground voltages from more than 15-volts to less than 4-volts, as required by the IGIT, the gaming machine manufacturer. The autotransformers, which were placed in series with approximately half of the subsystem loads, converted the six-pulse loads to twelve-pulse harmonic current profiles at their source transformers or UPSs.

Impact

The application of these devices resolved all identified operational and system incompatibility problems.

With annual energy savings of approximately \$241,381 and an installed cost of \$363,956, payback was achieved in less than 1.5 years with a rate-of-return better than 66%. If harmonic mitigation had been included in the original design, payback would have been achieved in less than 6 months.