

Case Study

Enhancing Biofuel Production Efficiency: Elspec's Equalizer System Increases Voltage and Enhances Power Quality in the US



The United States is a global leader in biofuel production, accounting for 47% of global output over the last decade, primarily driven by the Renewable Fuel Standard (RFS). Ethanol, primarily derived from corn, serves as a domestically produced renewable fuel, with the US Midwest standing as a key hub for corn-ethanol production, boasting a capacity of over 1.4 billion gallons annually from 19 plants.

Customer Situation

A Midwest-based ethanol plant faced challenges with low voltage levels and fluctuations, leading to frequent failures in electronic sensitive loads such as PLCs, Computers, and Smart Sensors, resulting in significant economic losses. Elspec's specialists in the US conducted a comprehensive power quality analysis using Elspec's G4500 [portable power quality analyzer](#) with continuous waveform recording and the PQSCADA power management software.

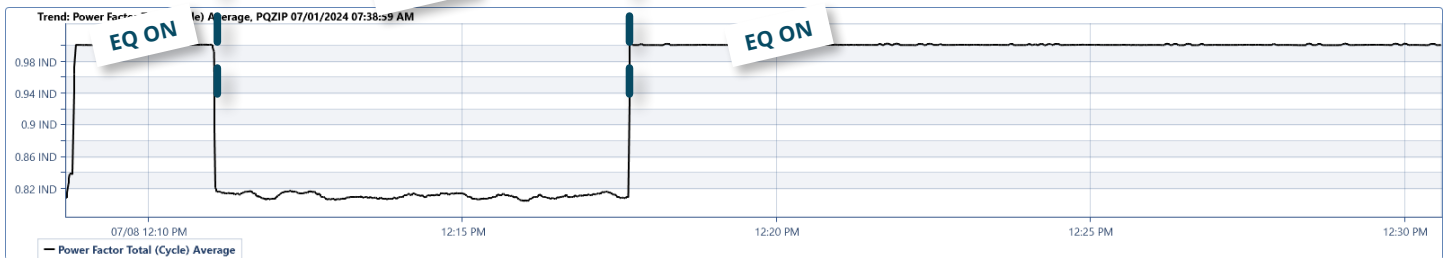
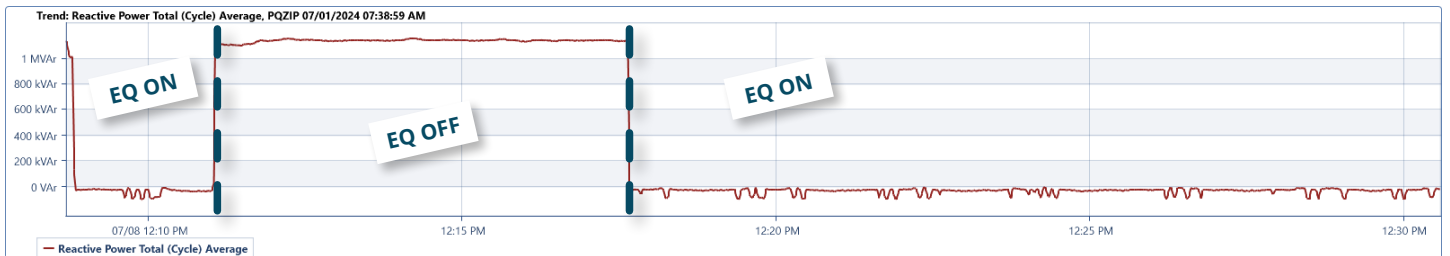
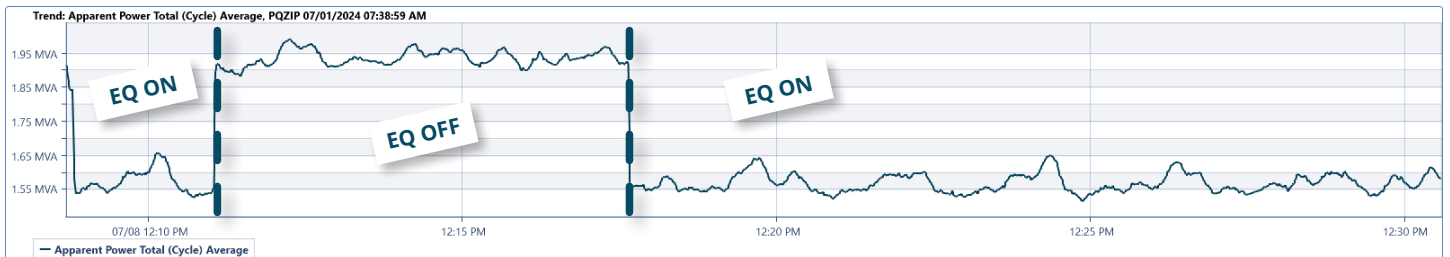
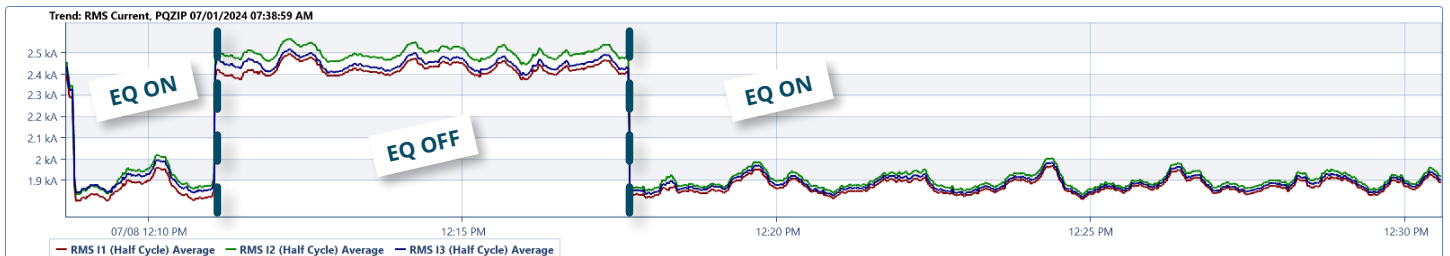
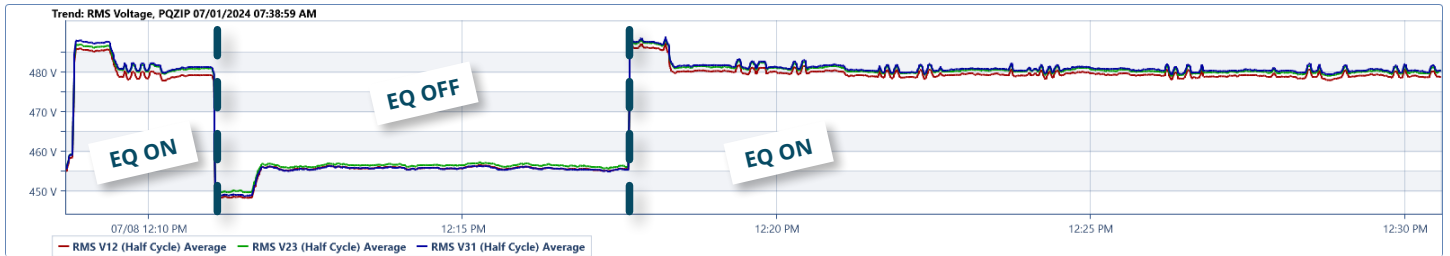
Solution: Real-Time Reactive Power Compensation & Voltage Stabilization System

Following the analysis, we recommended the installation of Elspec's 1748kVAr Equalizer system. The Equalizer, a real-time high-performance [power quality solution](#), utilizes thyristor switching technology to compensate reactive power, eliminate voltage drops, filter harmonics, reduce voltage flickering and fluctuations in less than 1 cycle to enhance production efficiency.

Results

Installing Elspec's Equalizer system increased the voltage levels from 457V to 482V and stabilized it at this level. Reactive power was reduced from an average demand of 1.2MVAR to almost 0kVAr. This led to an effective reduction of approximately 400kVA, delaying the need to increase the total kVA or upgrade the upstream transformer. Notice the reduction of about 400kVA in Apparent Power when the Equalizer is in operation. Power Factor significantly improved from 0.81IND to 0.99IND.

The graphs below illustrate the performance comparison with and without the Equalizer system.



Conclusions

The implementation of Elspec's Equalizer system at the Midwest-based ethanol plant effectively addressed the issues of low voltage levels and fluctuations, resulting in significant operational improvements and economic benefits. The system increased voltage levels from 457V to about 480V and maintained stability at this level, which was critical in preventing the frequent failures of sensitive electronic loads.

The Equalizer system also significantly reduced reactive power demand, bringing it down from an average of 1.2MVAR to nearly 0kVAR. This reduction in reactive power not only improved the overall efficiency of the plant's electrical system but also minimized energy losses and associated costs.

Furthermore, the power factor saw a marked improvement, increasing from 0.81IND to 0.99IND. This enhancement in PF indicates a more efficient use of electrical power, reducing the strain on the electrical infrastructure and leading to further economic savings.

Overall, the installation of Elspec's Equalizer system has proven to be a valuable investment for the biofuel plant, leading to improved reliability, efficiency, and significant cost savings.



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