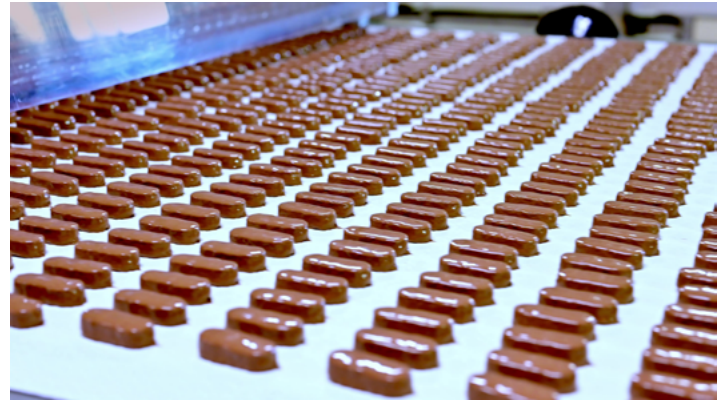


Case Study

Reaching Significant Energy Efficiency Through Power Quality



The ELSPEC Equalizer system compensated and stabilized the power factor levels in one of the largest Food & Beverage distributors in Latin America.

The multiple PQ events challenge

The Latin American Food & Beverage industry is expected to grow with a CAGR of 8.28% until 2028. The company in this case study is one of the largest Food & Beverage distributors in Latin America possess 7 food processing production plants that supply to over 70 countries worldwide.

The production plant in Colombia suffered from multiple power quality events and excessive reactive energy demand on their 3500 kVA, 13.2/ 0.44 kV transformer of boilers, which affected machinery downtime & production efficiency and risked the company with penalties for poor PF. The average power factor was 0.93 IND with average of 600 kVAr demand and peaks reactive demand of 1.4MVar reaching to PF of 0.87 IND. As a result of rapid peak reactive demand, the plant experienced voltage drops of 10%. The current waveform were distorted due to the amplification of the harmonics which was generated mostly by the existing capacitors banks at the time .

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

Elspec [Equalizer](#) 1020 kVAr system was installed to compensate the power. The Equalizer is a real-time high performance [power quality solution](#) for dynamic load compensation and as a result substantial energy efficiency. It is a highly accurate real time power quality system that compensates reactive power, eliminates voltage drops, harmonics filtration, reduces voltage flickering & fluctuations, enhances machinery life time, and improves production quality.



The Results

Power quality measurements were performed with Elspec's G4500 [portable PQ analyzer](#) and Elspec's [handheld PQ analyzer](#), the Pure BB. both equipped with Elspec PQZIP patent algorithm for continuous waveform recording. The charts below are all taken from Elspec PQSCADA Sapphire [power monitoring software](#).

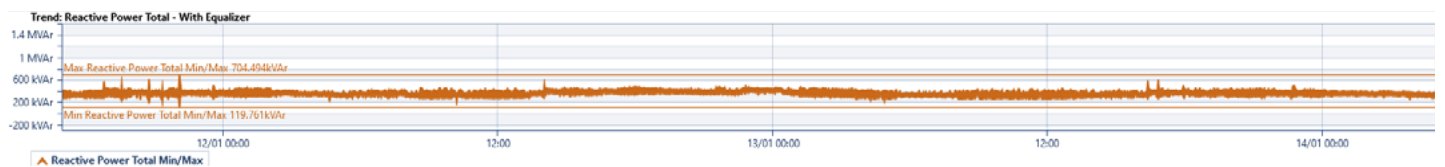
Power Factor: The Power Factor improved from average of 0.93IND to 0.97IND, placing the power factor values above the average value required by the national regulations.

Reactive Power: A 49.6% reduction in the transformer's reactive power was achieved. From an average demand value of 600 kVAr, reaching peak demand of 1400 kVAr to an average demand of 340 kVAr, reaching peaks of no more than 500 kVAr.

Without the Equalizer (Feb-2019)



With the Equalizer (Jan-2022)

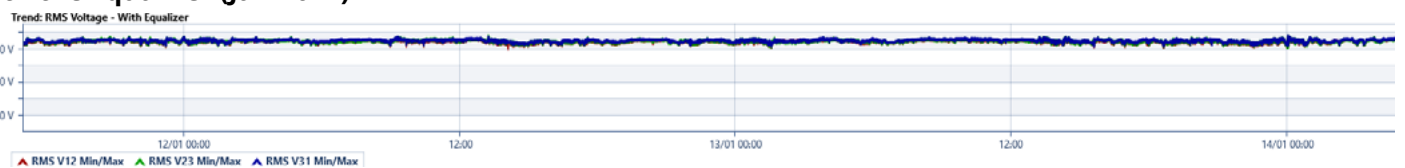


Voltage levels: The average voltage levels increased from 443V to 450V. The voltage drops of 10% were improved to 2%. The Equalizer system managed to stabilize the network and helped to prevent unexpected production stops (downtime) due to the input of loads on this transformer.

Without the Equalizer (Feb-2019)

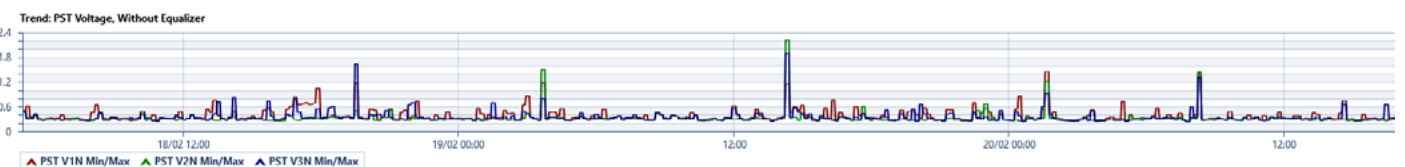


With the Equalizer (Jan-2022)

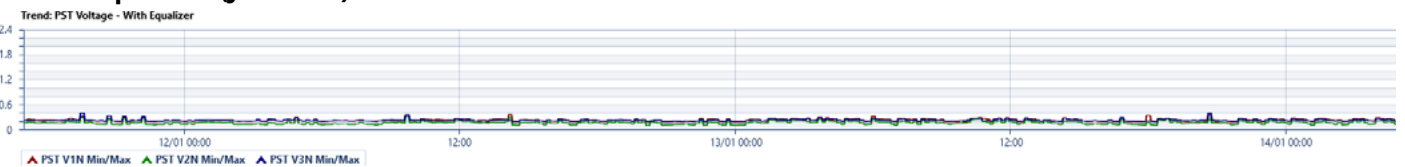


Flickering:

Without the Equalizer (Feb-2019)

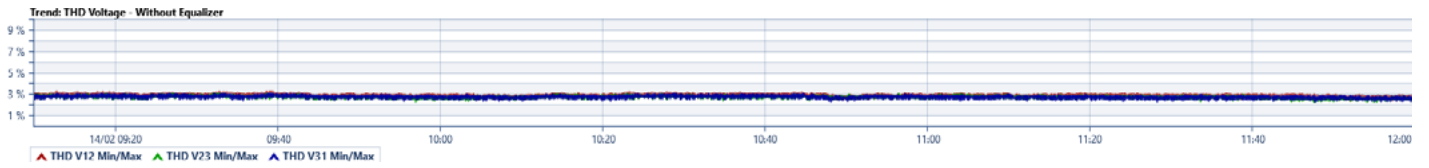


With the Equalizer (Jan-2022)

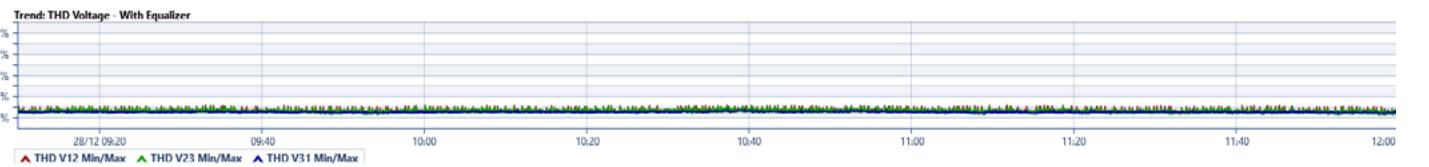


THD, Harmonic Distortion: The voltage Harmonic (THDV) and the Harmonic was improved from 2.17% to 1.52% and current harmonics (THDI) was improved from 3.53% to 3.07%. These results increased lifetime of electronic equipment in the plant.

Without the Equalizer (Feb-2019)

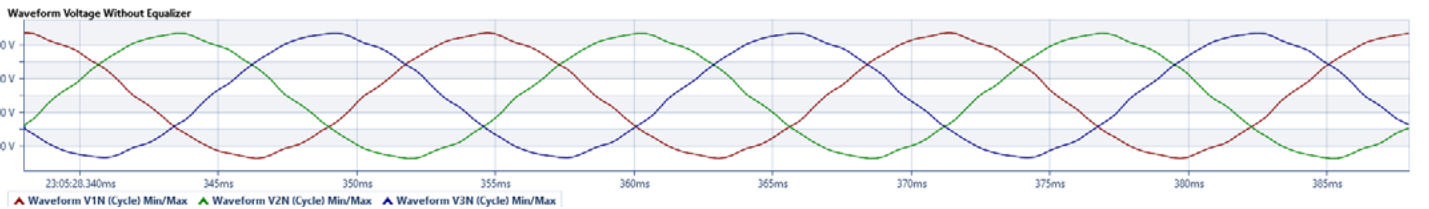


With the Equalizer (Jan-2022)

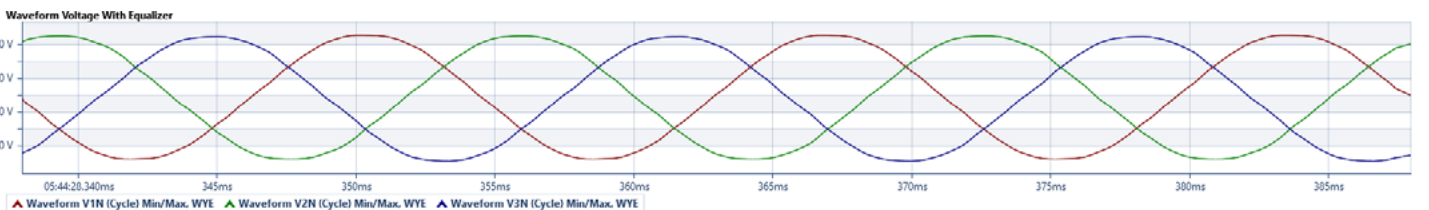


Waveform Voltage:

Without the Equalizer (Feb-2019)



With the Equalizer (Jan-2022)

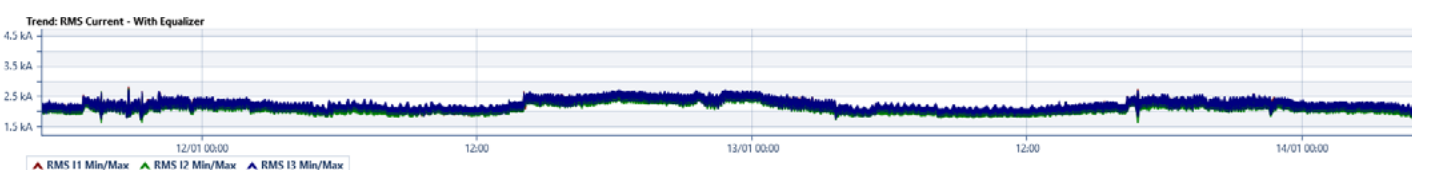


Current: The current waveform became much cleaner and stable with the Equalizer system, allowing the machines to work optimally.

Without the Equalizer (Feb-2019)



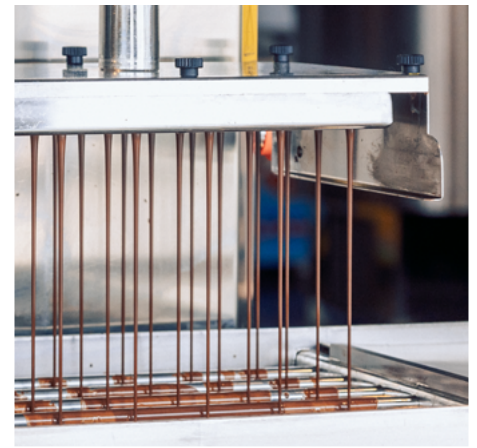
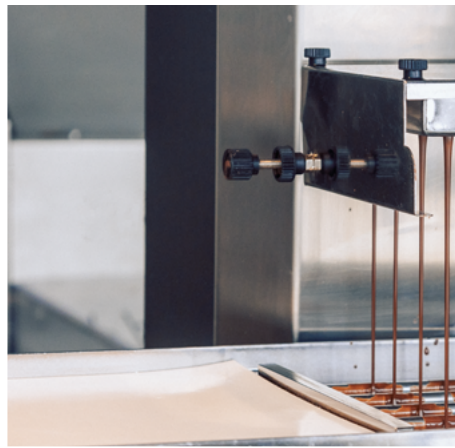
With the Equalizer (Jan-2022)



Finally, Efficiency improved from an average of 1.75 MW to only 1.60 MW under the same operational conditions, obtaining an efficiency in active power of 8.28%.

Conclusions

- The ELSPEC Equalizer system increased and stabilized the Power Factor levels in the transformer of the boilers, optimizing the use of the Power delivered and thus reducing the excessive transport of reactive energy, for which the company could have been penalized with the new regulations.
- The system reduced harmonic distortions and increased life time of electronics.
- Constant voltage drops generated by the reactive power spikes were almost completely eliminated, preventing unexpected production stops (downtime).
- Significant energy efficiency was achieved through dynamically compensating the reactive energy, and optimizing network conditions.
- By dynamically compensating the reactive energy, greater efficiency was achieved



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