Case Study

Ending Penalty Payments through Optimized Reactive Power: Elspec's Hybrid Solution in Action

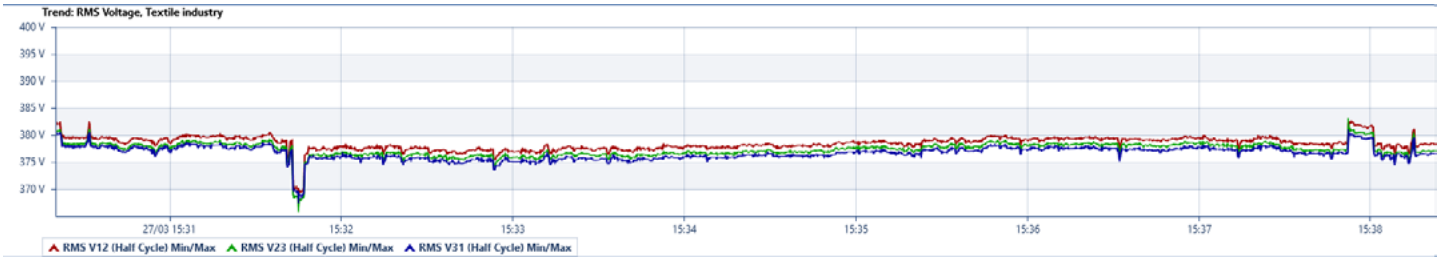
The issue of reactive power has long been recognized as a significant disturbance on electrical power grids. In the industrial sector, the necessity for reactive electrical power compensation arises due to substantial penalties imposed on generated or consumed electrical energy. These penalties lead industrial consumers to mitigate their reactive electrical energy consumption through compensation methods. Given that investments in reactive electrical power compensation equipment often yield returns over several years, the industrial sector is particularly invested in implementing such procedures.

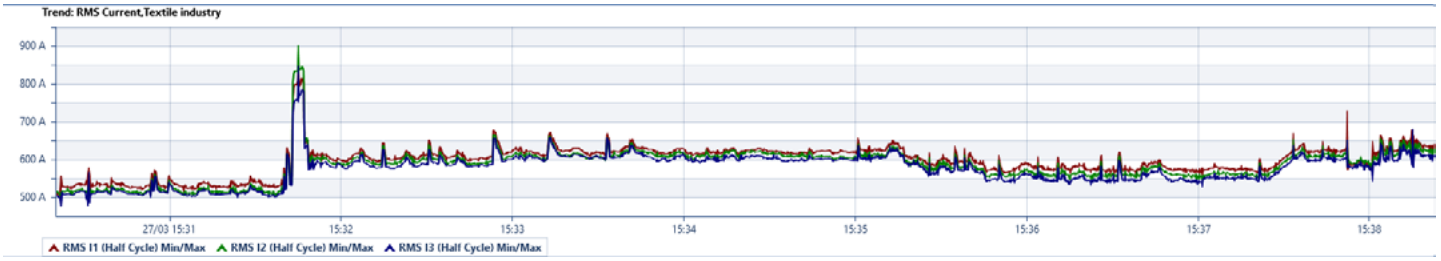
A notable trend in reactive electrical energy is the shift from inductive to capacitive, driven by advancements in electrical appliance technology. This transition is evident in the increased adoption of LED lighting and inverters in energy supply chains, including solar rooftops. Consequently, several European countries have introduced penalties on reactive electrical energy production to incentivize users to minimize their impact on the electric energy supply network.

Countries such as Italy and Germany have implemented regulations to this effect, particularly with the proliferation of smart grids. Some nations, like Belgium and Croatia, have focused penalties on reactive electric energy in medium and high voltage networks. Notably, Latvia leads in imposing penalties for reactive energy spending in electric networks, with Estonia and Slovenia following suit. Recently, Lithuania has expanded tariffs to include the reactive component in consumed electric energy for all consumers, including those at low voltage levels.

Customer Situation

A textile production factory in Lithuania faced significant penalties due to reactive power production. The factory had an average reactive power of 110kVAr, with inductive peaks reaching up to 320kVAr.





In Lithuania, the penalty for each kVAr of inductive power is 0.71 Euros per hour. Seeking to mitigate these penalties, the customer sought to install a power quality solution to reduce reactive power while avoiding exposure to penalties for capacitive reactive power. Notably, in Lithuania, the penalty for each kVAr of capacitive power is even higher at 1.42 Euros per hour, surpassing the penalty for inductive power.

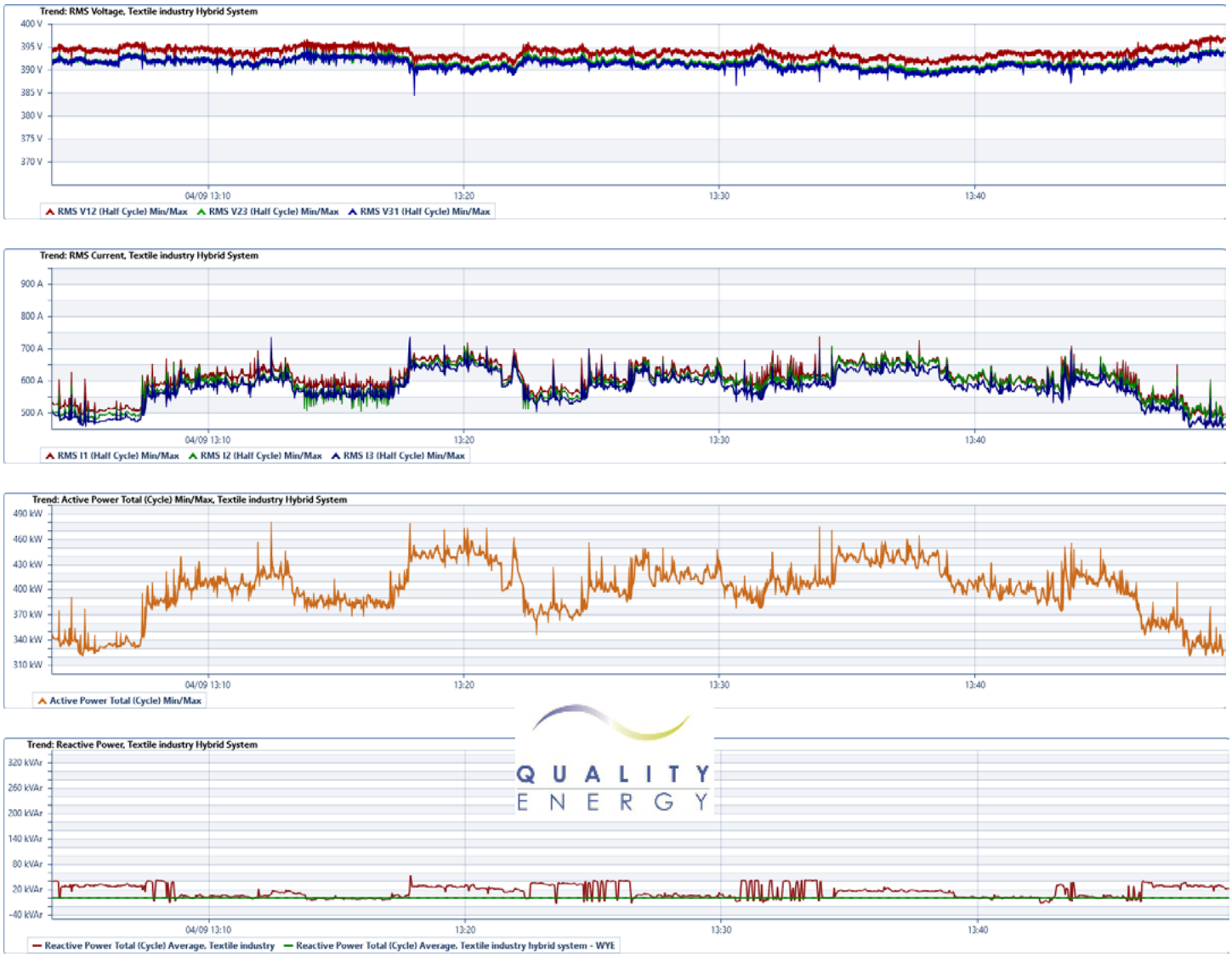
The customer reached out to Nominus, Elspec's agent in this region, for assistance.

The Solution

Following an investigation, our agent recommended the installation of Elspec's Equalizer Hybrid power quality solution. Elspec's Hybrid solution is a unique combination between Elspec's reactive compensation system with tuned filters, and an active filter. This unique combination allows for precise control and optimization of reactive power compensation, effectively mitigating penalties associated with both inductive and capacitive reactive power.

Results

After installing Elspec's 275kVAr PQ Solution, voltage levels increased and stabilized around 393V.



The Reactive Power graph illustrates the performance comparison between the system with and without the active filter component of the hybrid solution. The red line represents the system's reactive power profile without the active filter, showcasing that while the system reduced the inductive reactive power, it also injected some capacitive reactive power. The green line, representing the total performance of the solution, incorporating the active filter, demonstrates stable and optimized reactive power control. The optimization of reactive power to approximately 0kVAr suggests that Elspec's solution successfully managed and balanced the reactive power demand within the system. By compensating reactive energy in real-time, the solution reduced energy losses and minimized penalties associated with both inductive and capacitive reactive power consumption.

Conclusions

These results highlight the effectiveness of Elspec's Hybrid PQ Solution in stabilizing voltage levels, optimizing reactive power, and enhancing overall power quality within the customer's electrical network. By addressing these key parameters, the solution contributes to improved network reliability, efficiency, and cost-effectiveness.

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