

CASE STORY

Flicker Mitigation and Power Quality Improvement at Van Merksteijn International

» **INDUSTRY**
Reinforcement Products

» **CUSTOMER**
Van Merksteijn Int.

» **LOCATION**
Almelo, The Netherlands

» **TIMELINE**
2025

BACKGROUND

Van Merksteijn International operates within the reinforcement products sector, with production based in Almelo. The facility runs a steel manufacturing process characterized by rapidly varying, non-linear electrical loads. These load profiles introduce significant disturbances in the electrical network, particularly in systems where grid short-circuit capacity is limited relative to load dynamics.

Such environments are inherently prone to power quality issues, including voltage fluctuations and light flicker at the point of common coupling (PCC). These disturbances directly affect both operational performance and compliance with grid requirements.

CHALLENGE

The manufacturing process for construction steel involves dynamic load behavior with irregular and fast-changing current consumption. Such load profiles generate voltage fluctuations in the supplying network, particularly when the short-circuit power of the grid is limited relative to the load variations. In this case, the resulting voltage modulation caused visible light flicker throughout the facility and negatively affected plant operation.

Flicker severity was evaluated using standard power quality indices. Short-term flicker severity (Pst), measured over a 10-minute interval, and long-term flicker severity (Plt), derived over a 2-hour period, are widely used to assess both human perceptibility and grid compatibility.

Measurements taken prior to mitigation showed Pst = 2.5 and Plt = 2.2. These levels exceeded the acceptable limits defined by the grid operator. As a result, the facility faced ongoing financial penalties, reduced electrical network stability, and an increased risk of disturbances in sensitive equipment. The visible flicker also contributed to suboptimal working conditions within the plant.

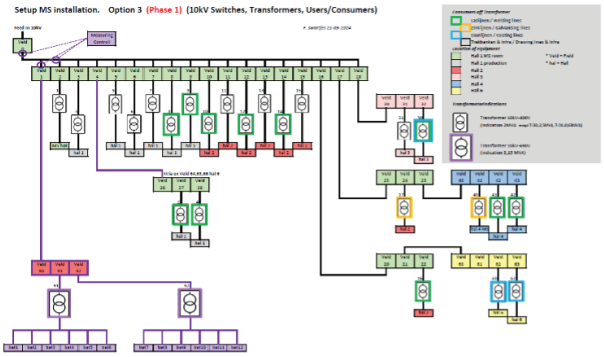


SOLUTION

To address the power quality issues, a compensation system based on active harmonic filters was implemented. The environmental conditions at the site, including dust and demanding operating cycles, required a solution with robust thermal management. A liquid-cooled active harmonic filter system was therefore selected.

The installed system consists of twelve ADF P300W-420/690 units, providing a total compensation capacity of 5040 A. These units are supplied via two transformers rated at 3.15 MVA each, with a voltage level of 10.5 kV / 0.69 kV. The system includes dedicated cooling pump arrangements to support continuous operation under industrial conditions.

According to the single-line diagram, the flicker mitigation solution was integrated at the low-voltage level, where the filters continuously monitor load behavior and inject a compensating current in real time.



When fluctuations are detected, the system injects a compensating current in real time. This current is designed to counteract the rapidly varying reactive and distortion-related components generated by the process. By doing so, the system stabilizes the voltage at the PCC and reduces flicker propagation into the upstream network.

Following installation, the customer received local support from our partner Frakol, who provided training and commissioning support to ensure correct operation of the system and proper handover to site personnel.



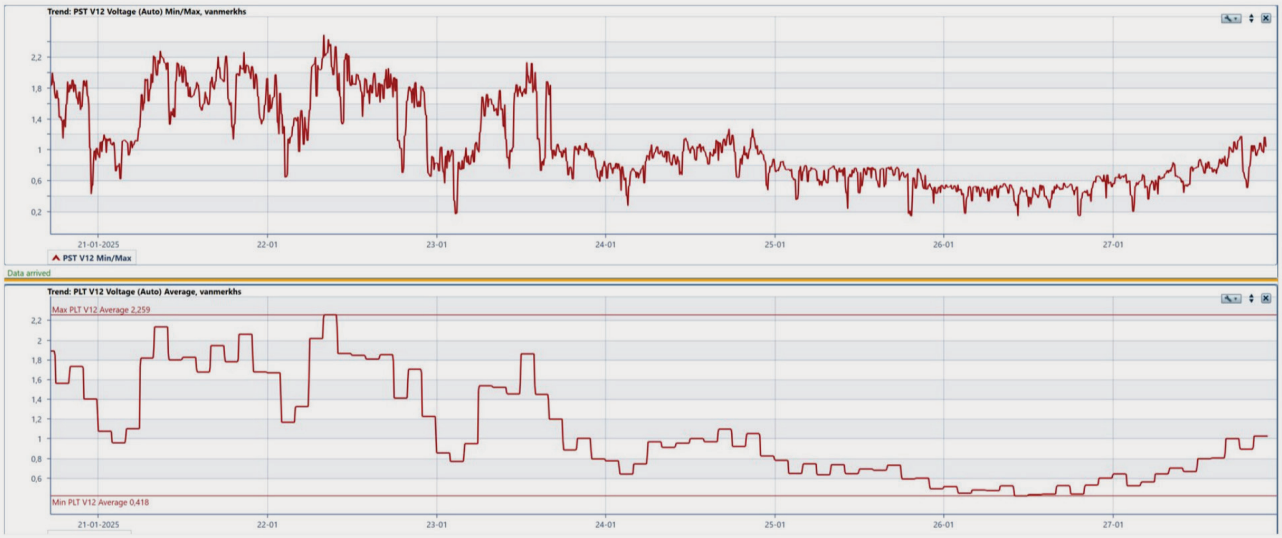
RESULTS

Prior to installation, measured flicker levels at the site were Pst = 2.5 and Plt = 2.2, exceeding acceptable limits defined by the grid owner.

Post-installation trend data shows a clear reduction in flicker severity. Short-term flicker (Pst), which previously fluctuated at levels typically between approximately 1.5 and above 2.0, was reduced to a range generally below 1.0. Long-term flicker (Plt), previously observed around 1.5 to above 2.0, decreased to values typically between approximately 0.5 and 1.0, with minimum levels recorded near 0.4.

The measured compensation behavior confirms that the active flicker filters tracked load variations and injected an opposing current profile, reducing the impact of fluctuating loads on the electrical network. This resulted in improved power quality, reduced voltage fluctuations, and a more stable operating environment.







PRODUCT USED IN THIS CASE

ADF P300

- HARMONIC ELIMINATION
- LOAD BALANCING
- DYNAMIC VAR COMPENSATION
- MODULAR & SCALABLE DESIGN
- FLICKER COMPENSATION
- 208-690V NOMINAL VOLTAGE
- CLOSED LOOP, OPEN LOOP & SENSORLESS CONTROL