YOUR VOLTAGE – OUR PASSION

Case Study

Optimizing power quality in an industrial brewery

CONDENSATOR DOMINIT

Case Study

- **Where: Germany**
- **Industry: Brewery**
- **Installation date: 2025**
- **Product: SIMΩN® mod + SΦFIA® mod H5**

Background

Industrial breweries are highly automated production operations with complex electrical infrastructures. The reliable operation of equipment such as pumps, compressors, and sensitive control systems depends significantly on a stable, high-quality voltage supply.
Despite advanced equipment, breweries often face a significant issue in this regard: network fluctuations caused by connected electrical loads. These disturbances not only affect the efficiency of the production processes but also shorten the lifespan of electrical equipment. This leads to higher maintenance efforts and thus rising costs.
The main cause of these problems are modern, power-electronically controlled devices such as LED lighting, frequency converters in ventilation systems, as well as pumps and conveyor systems. These consumers create strong non-linear loads in the network, which lead to a flat-topping of the voltages' peak values. Such phenomena occur much more frequently today than a few years ago and pose an increasing challenge for industrial operations like breweries. A sustainable solution therefore requires targeted and efficient measures to improve the voltage quality and meet the increasing demands.

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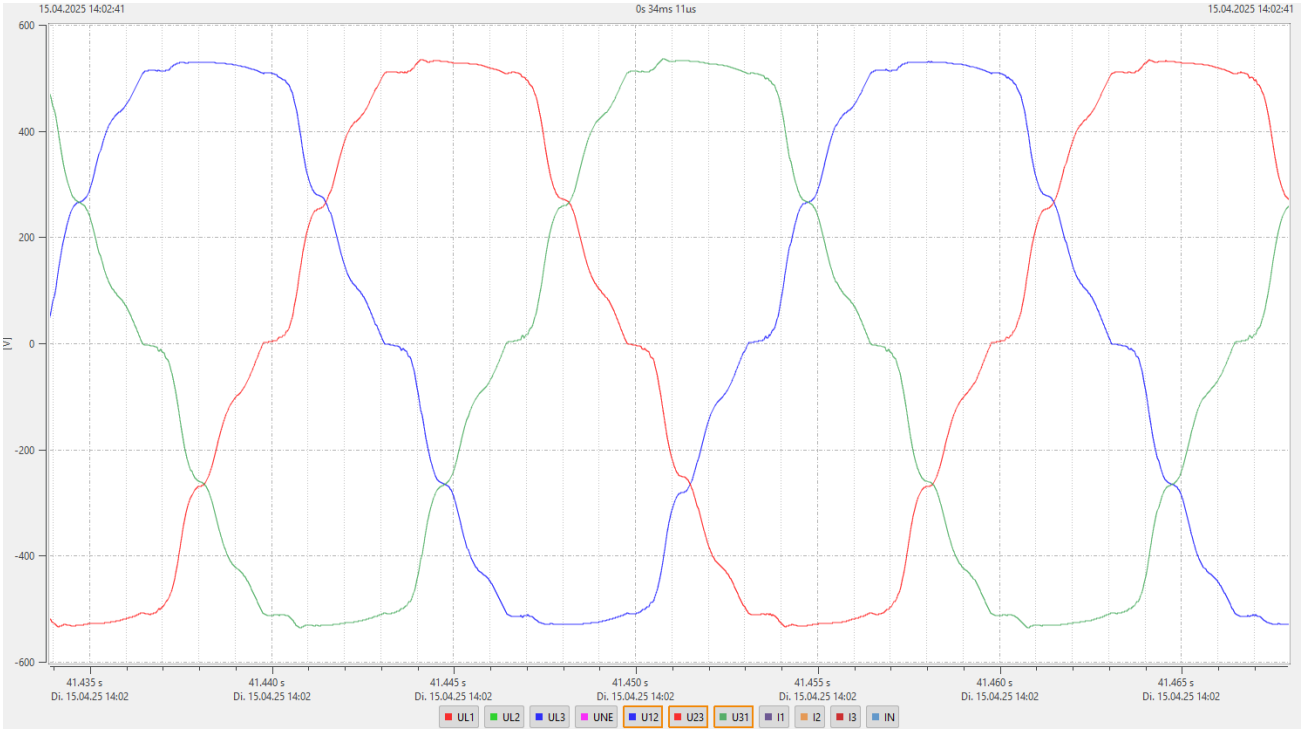
Challenges

In advance, a clear distortion of the sinusoidal voltage waveform was detected during monitoring of the network. The high harmonic content already exceeds the permissible limits according to IEC 61000-2-4, EMC Class 2 at several points, which can lead to disturbances in the network. Especially in highly automated processes, such as bottle filling systems in breweries, voltage supply disturbances can cause significant problems. Even with slightly flattened peak values, the intermediate circuits of frequency converters can no longer be properly recharged, causing entire converters to fail. Due to the high clock rate of the machine already small impairments can result in broken glass or even complete failure. Additionally, the increased load on the network can lead to higher costs for the brewery and equipment may lose its warranty.

Power quality before installation of the modules



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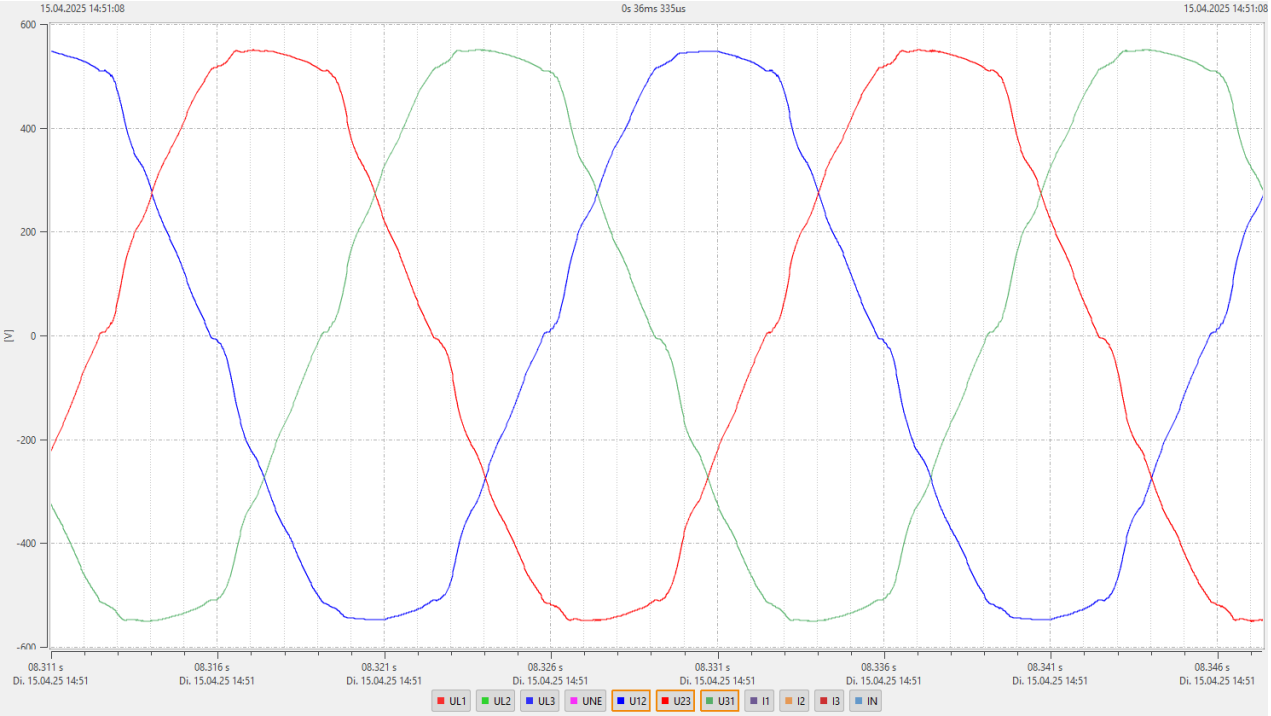
Solution

To dampen the identified harmonics, a broadband filter was chosen, consisting of two SΦFIA® H5 modules and a SIMΩN® module. The SΦFIA® H5 module specifically manages the filtering of the strongly pronounced 5th harmonic.
The additional SIMΩN® module provides broadband damping of the remaining harmonics which are then converted into a smoothed 50 Hz sinusoidal oscillation and fed back into the network.

This solution ensures:

- full **compliance with all relevant limits** according to IEC 61000-2-4, EMC Class 2,
- targeted **filtering of the 5th harmonic** and **broadband filtering by the SIMΩN® module**
- **local energy recycling function**

Power quality after installation of the modules



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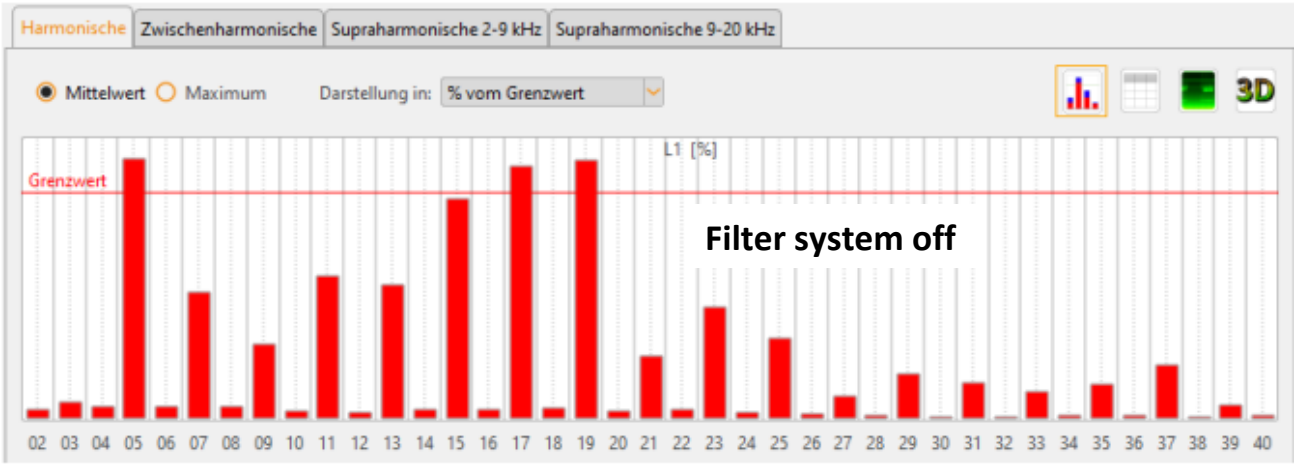
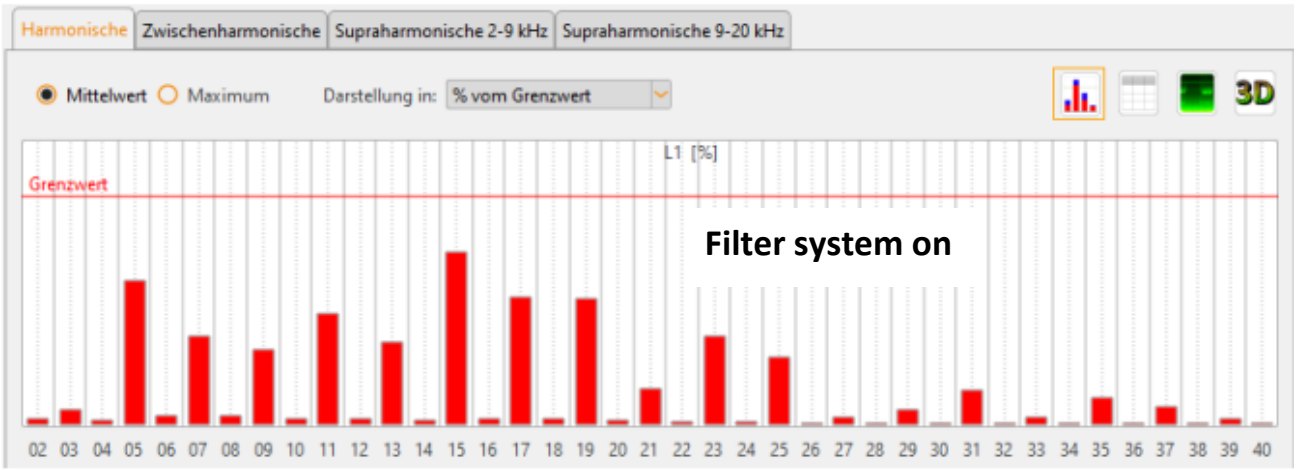
Voltage spectrum compared to the limit values according to IEC 61000-2-4, EMC Class 2





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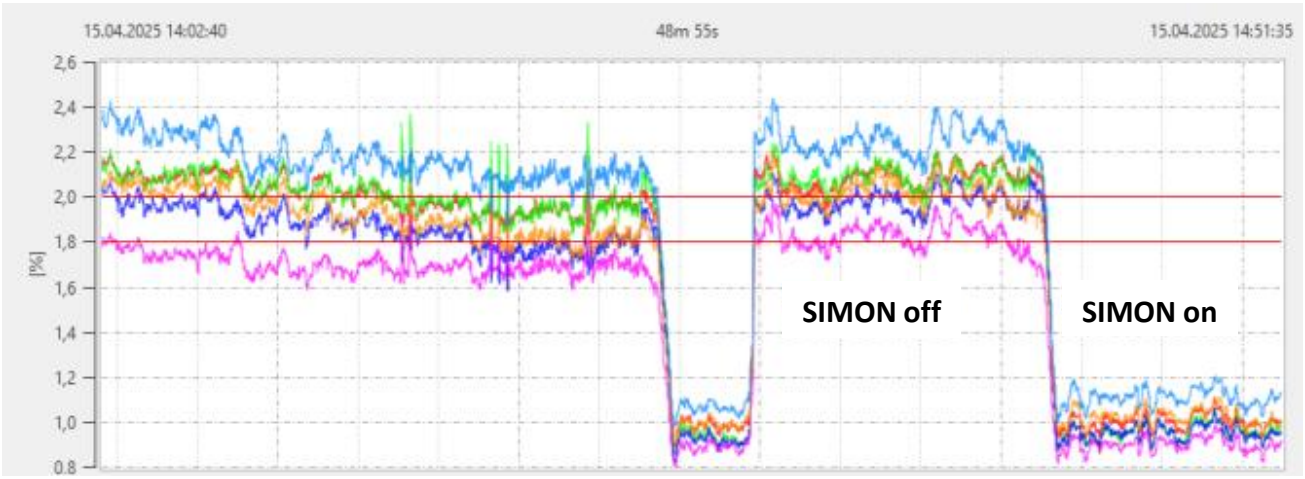
5th harmonic of the voltage in percent compared to the limit value (6%) of the standard IEC 61000-2-4 EMC Class 2

17th and 19th harmonic of the voltage in percent compared to the limit values (2% and 1.8%) of the standard IEC 61000-2-4 EMC-Class 2



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Used products

- Damping of harmonics up to 2.5 kHz
- Local energy recycling of harmonics
- Highly developed digital control
- Overload protection via automatic intelligent current limitation

- Filtering of the 5th harmonic
- Automatic adaption to grid changes
- Overload protection via automatic current limitation
- High power and reliability
- Easy installation and maintenance
- Low losses

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