Adequate power quality in industrial companies bares a huge financial potential. Many electronic devices and automation systems in industrial production facilities are sensitive to voltage variations in the power supply often caused by unexpected sources. Furthermore, they can also cause faults themselves and feed them back into the supply system.

Continuously recorded and evaluated measurements relevant to power quality help to detect disturbing issues and offer the chance to correct failures. Some of these failures do not seem so obvious at first sight.

This paper describes 3 real use cases of power quality issues in a highly automated and digitized factory for Intelligent Electronic Devices (IED).

Use case 1: Robot failure

Short current peaks cause enormous Non-Conformance Costs (NCC).

While today robots are used in modern integrated production procedures, their sensitive motors can react to voltage disturbances. In this use case, laser robots are used for marking housings of IEDs.

On large and complex marking procedures, laser robots show failures that finally lead to a downtime of the production. This downtime could last around 30 minutes or longer per occurrence. Troubleshooting can cost up to 10 man days per event.

Possible impacts are loss of time and additional NCC caused by the production stop, coordination efforts, and burden of proof.

The SICAM Q200 power quality instruments are the best choice to investigate the cause of the failure. With the Web browser integrated in SICAM Q200, the fault records and power quality data of the power supply network to which the robot is connected are analyzed. With this information, a fast localization of the cause of the robot failure can be concluded. Detected short current peaks prove that robot failures can be caused by a design fault in the power supply of the robot.

At the end of the analysis, a proper communication with the manufacturer of the robot can support a redesign of the power supply unit of the robot and the cure of one possible production-shutdown root cause.
Use case 2: Fault in production process calibration

HF (high frequency) transients lead to production stop

Calibration measuring devices are used for final device tests in a production line for IEDs. In this use case, such calibration measuring devices show failures in operation, final device tests cannot be performed, and the production process comes to a shutdown lasting for several days. The risk for paying delay penalties to customers increases seriously.

The analysis of the fault records and power quality data with the SICAM Q200 power quality instrument can clearly localize the cause of the faults. The system incidents in the calibration laboratory are caused by HF transients originating from switching-in the compressor of the air conditioning.

Installation of active line filters and a modification of the low-voltage distribution network avoid this fault for the future.

Use case 3: IT failure and production interruption

Voltage dips cause IT-infrastructure system failures

Voltage dips of up to 150 ms disturb individual production machines and IT infrastructure. These disturbances can lead to a production shutdown, failures in IT infrastructure, and troubleshooting in several areas. The possible consequences are: loss of time and data, additional NCC caused by the production stop, coordination efforts, troubleshooting, and IT-infrastructure failure for hours.

With the SICAM Q100 and SICAM Q200 power quality instruments, you can clearly detect the cause of the disturbances. Analyses of the power quality data and fault records with the Web browser integrated in SICAM Q100 and SICAM Q200 show that the voltage dips are caused by switching operations at the distribution transformer. The power supply can now be optimized by separating the feeder for the factory.