



Reducing energy consumption of factory infrastructure by digitalization

Siemens electric motor factory in Bad Neustadt an der Saale

SIEMENS

SIEMENS ELECTRIC MOTOR FACTORY IN BAD NEUSTADT AN DER SAALE

Reducing Energy Consumption with Analyze MyDrives on Industrial Edge



EWN Bad Neustadt an der Saale

The customer

Siemens AG

The Siemens electric motor factory in Bad Neustadt is the lead factory for the production of synchronous, main, and asynchronous motors. Continuous innovations of the motors produced in Bad Neustadt have secured the company's competitive position in the segment of drive technology to this day.

The electric motor plant is managed within the company as a showcase factory for digitalization. The transformation into a Digital Enterprise was implemented to better meet customer requirements: short and reliable delivery times, greater flexibility, and more sustainable production. This has only been possible through digital transforma-

tion – with the help of purposefully deployed technology, on the one hand, and by training employees and integrating them closely into the new processes, on the other.

With the “Arena of Digitalization”, the Siemens electric motor plant in Bad Neustadt offers interested customers and partners comprehensive information and concrete assistance for digitalization projects on more than 800 square meters.



Figure 1: Filter and pump application for cooling lubricant in Bad Neustadt factory

The challenge

As the sustainable production is an important part of the Digital Enterprise concept the focus has been put on energy efficiency in Bad Neustadt production plant. And a potential for improvement has been identified in the production infrastructure. Specifically, the challenge was to optimize the energy efficiency in cooling lubricant pump infrastructure (see figure 1). The pumps of the central cooling lubricant supply for the Mechanical Production Units run continuously and must circulate the cooling water.

“Of course, we have to bear in mind that gaining data and transparency is a prerequisite for any optimization actions,” says Lukas Schlembach, Data Scientist at Siemens, who was leading the optimization initiative. Thus, it was crucial for the project to start with implementing means of monitoring the energy consumption of the pumps’ drive train. “We wanted to gain hard data on the energy consumption of the pumps, which would enable us to assess whether there is a potential for energy saving,” adds Lukas Schlembach.



Figure 2: Cabinet with SINAMICS G120C drives and Industrial Edge PC (SIMATIC IPC227 NANOBOX PC)

The solution

The task at hand was to gain insights on the performance of the application through digitalization of the drive train.

The ideal solution was found by connecting the G120C frequency converters that drive the motors of the pumps via Profinet to SIMATIC IPC227 NANOBOX PC – Industrial Edge PC, where Analyze MyDrives Edge with Energy Efficiency extension runs, and Drive System Framework was installed for data acquisition of drive parameters (see figure 2).

The Drive System Framework Industrial Edge app continuously reads data from the SINAMICS G drives and transfers it to the Industrial Edge Databus. The Analyze MyDrives app receives the data from the Databus and ensures transparency about energy consumption of the drive train. Analyze MyDrives in combination with Drive System Framework calculates all relevant KPIs related to energy efficiency without any additional sensor or special measurement equipment.

The result

Thanks to the continuous monitoring of real-time data on energy consumption of the drives it was discovered that the power consumption during the weekends was about 90% higher than the average weekdays consumption (see figure 3). That was an alarming finding, since the production was not running during the weekends. This fact indicated that there might be an issue in the PLC code or controllers causing an unnecessary power consumption.

A first remedial action on PLC has been immediately taken and cyclic operation of the pumps during weekend was introduced (see figure 4). That resulted in reduction of energy consumption and energy costs. "With the support of Analyze MyDrives Edge we have been able to optimize the operation of our equipment. This optimization led to less energy consumption, less wear and so to less costs", says Peter Zech, Head of Innovation and Digitalization of the factory in Bad Neustadt.

By implementing the digitalization of the drive train, Bad Neustadt factory gained transparency of energy consumption, associated costs and progress on the KPIs for energy efficiency. Overall the annual savings are very impressive. The first optimization measures that have been put in place saved more than 43 MWh of electrical energy per year and brought about 9 500 EUR annual energy costs savings. The factory in Bad Neustadt already uses CO₂ neutral electricity, so there was no direct impact on CO₂ emissions reduction. But the equivalent amount of the abated CO₂ would have normally been about 18,5 tons.

Moreover, by increasing efficiency and reducing the operation time, it was possible to extend the assets' lifetime and hence lower the OPEX & CAPEX (Operational expenditures & Capital expenditures). In general the transparency of the health status of the entire drive train available at any time helps to discover malfunctions or failures in the drive train before they can cause a downtime, thus increasing the productivity/availability (OEE*) of the whole production plant.

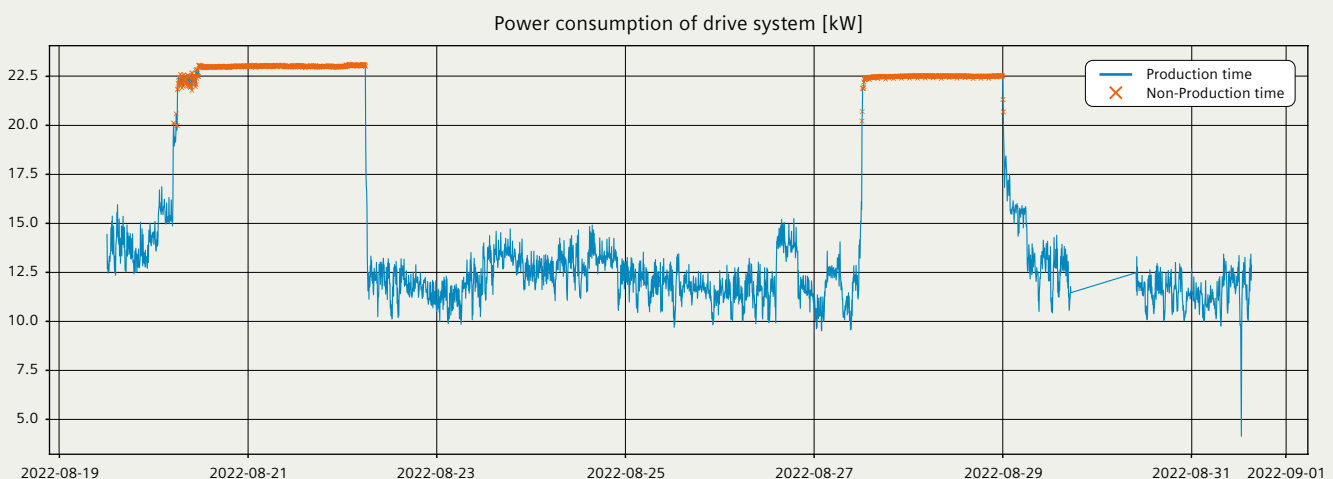


Figure 3: Two peak plateaus (orange-colored) showing the weekend power consumption that was about 90% higher than a weekday average

*OEE (Overall Equipment Effectiveness): OEE measures how efficiently a factory or production line runs and the availability of the equipment concerning its capacity. OEE indicates the percentage of manufacturing time that is truly productive.

Return on investment

The successful implementation of the optimization measures in Bad Neustadt indicates a return of investment (ROI) of less than half a year (5,3 months). As the cost of energy saved per year highly offsets the investment in the digitalization – the hardware and software used. More details are to be found in the info box.

Info Box: Return on Investment

- Cost of hardware and software: 2 900 EUR
- Cost of energy annually saved: 9 500 EUR
- ROI = 228% (5,3 months)

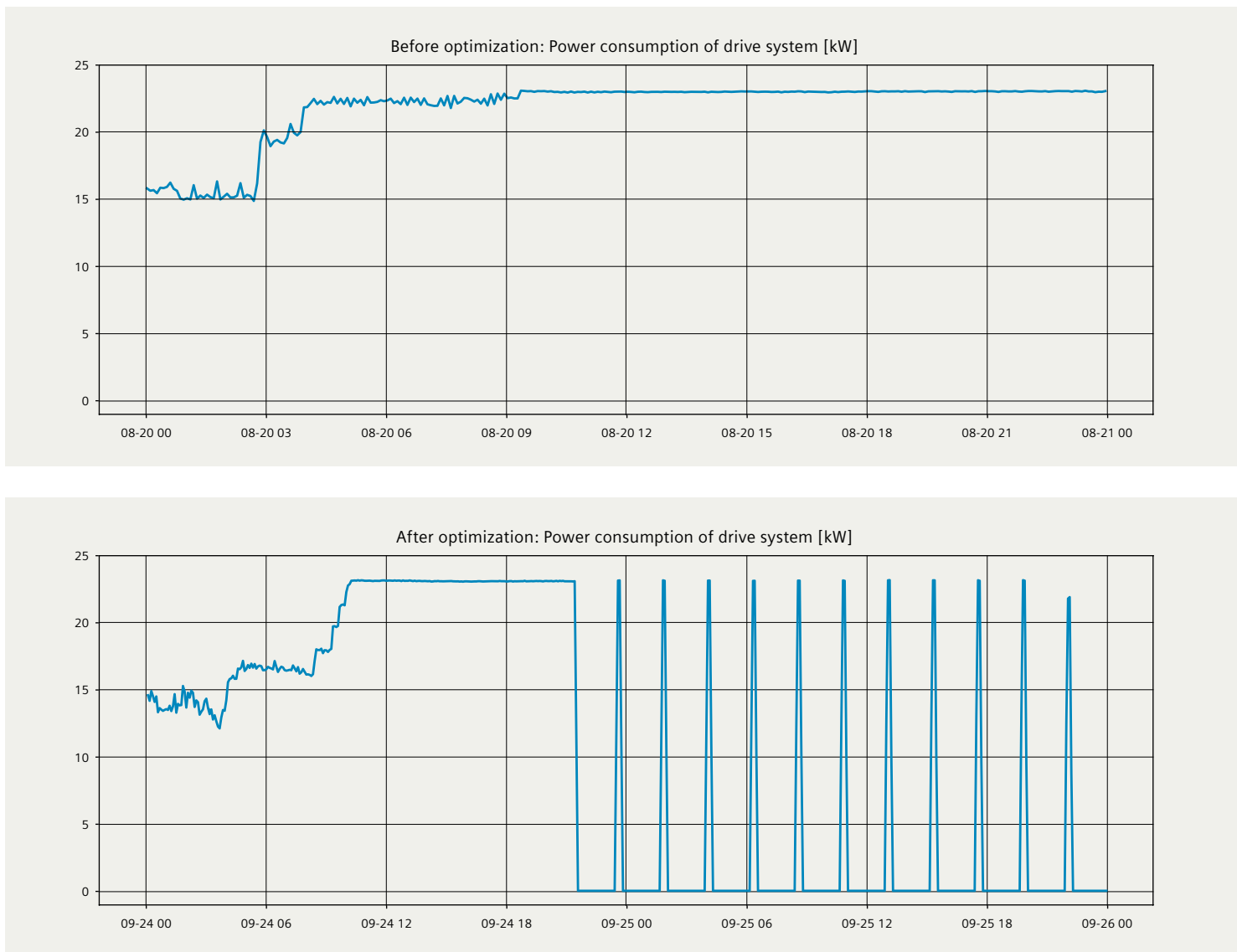


Figure 4: Comparison of the power consumption before and after the optimization

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