PFC200 at PSI Technics:
Optimizing Energy Efficiency and Throughput

PSI Technics Ltd. relies on the PFC200 and its real-time capable Linux® operating system for their innovative positioning controls.

■ Substantial potential for optimization is often hidden in the positioning systems for intralogistics applications, such as for stacker cranes and storage and retrieval vehicles. In this machinery, both throughput and energy efficiency can be significantly improved. To achieve this, PSI Technics Ltd. offers the ARATEC solution. Based on movement profiles, this sophisticated positioning system clearly shortens storage and retrieval processes in warehouses. And in order to provide the promised performance, the engineers at PSI Technics turned to WAGO's PFC200 to calculate the algorithms for optimized travel profiles.

Automatic positioning systems play an important role in many production and logistics sectors, for example, in conveying systems or for storage and retrieval vehicles in intralogistics. PSI Technics Ltd. develops solutions for these applications that increase throughput, improve energy efficiency and reduce wear. The basis for ARATEC, which is suitable for use in one to three axis positioning systems, is an optimized travel profile control that accounts for the specific kinematics of an entire system. The company, based in Urmitz, Germany on the Rhine, has also developed sensitive algorithms that detect, among many things, oscillations in the system and incorporate these into the controls. ARATEC functions using conventional sensors, controllers and drives.

High Demands on Computing Power

"The algorithms and control software are demanding and were written primarily in the C programming language. These form the foundation for our solutions," explains Karl-Heinz Förderer, founder and CEO of PSI Technics. So, it should come as no surprise that software engineers constitute 40 % of the company. "Demanding control tasks are only part of the picture; the other is the ability to quickly perform them. For that, we need correspondingly powerful hardware," states Bastian Zimmermann, the engineer at PSI Technics responsible for software development.

This need has made WAGO's PFC200 their preferred platform. Zimmermann explains the decision to use a controller running a real-time capable Linux® operating system, stating that, "A controller based exclusively on CODESYS or a PLC would be far too slow." The compact PFC200 functions with a Cortex-A8 processor, which provides the computing power required by PSI Technics. The controller has two ETHERNET interfaces: support for additional fieldbus systems is a standard feature. Thanks to compatibility with the WAGO-I/O-SYSTEM 750, a suitable I/O module is available for almost every type of signal.
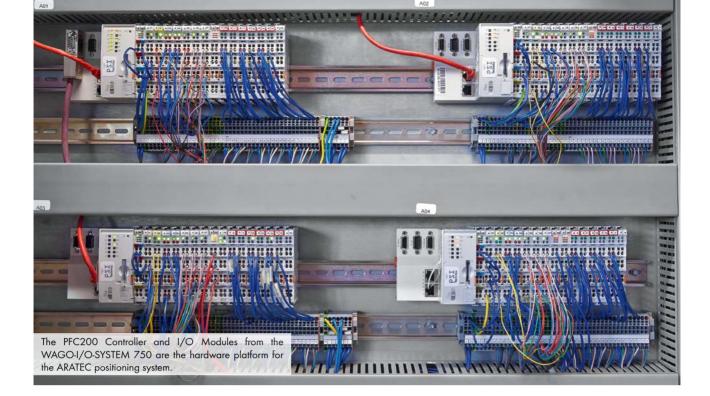
Retrofit Existing Systems

A large number PSI Technics' projects are retrofits. "When our system is integrated into older facilities — for example, an automated warehouse with storage and retrieval vehicles — customers often report substantially increased throughputs," reports Förderer. The optimized travel profile control also reduces the stress placed on mechanical components, which in turn leads to less wear. In addition, energy consumption is also significantly reduced.

During a retrofit, the original controller — usually a PLC — is retained. The converter and other components also do not necessarily need replacement. The ARATEC positioning system assumes control of the drives and brakes, while reading signals from the position encoders. The PFC200 is equipped with I/O modules suited for executing this. "For example, we use SSI bus modules so that we can directly receive signals from the rotary encoders," explains Zimmermann.

The connection to a higher-level PLC, which sends the movement commands to the position controller, is usually carried out using ETHERNET or PROFIBUS.

The drives are typically addressed using CAN. The WAGO-I/O-SYSTEM provides suitable interfaces for communicating at the automation level and also for data transmission at the field level.

Karl-Heinz Förderer is completely sold on the performance of the new hardware platform.

The PFC200 Controller and I/O Modules from the WAGO-I/O-SYSTEM 750 are the hardware platform for the ARATEC positioning system.

Thus, for example, analog outputs can be used for the setpoint definition of drives. And to ensure efficiency, WAGO's 3-Phase Power Measurement Modules are used to detect the consumption of electricity. In addition to measuring energy consumption levels, this enables monitoring of the key parameters for network quality. According to Zimmermann, "This allows us to detect potential circuit feedback from frequency converters."

■ Conclusion
The PFC200 has been used in the ARATEC system since the beginning of last year. "During the hardware exchange period, WAGO's technical sales people provided us with optimal support," recalls Förderer. WAGO initially provided PSI Technics with loaner devices so that they could comprehensively evaluate the hardware in a number of test sequences.

"The controller's performance was overwhelmingly convincing. The global availability was also an essential reason for selecting the PFC200 as the new platform," Förderer, the CEO concludes. "After all, ARATEC will also be used around the world by our customers."

Text: Michael Radau and Helmut Saal, WAGO
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- The WAGO PFC200 — equipped with enormous computing power thanks to a Cortex-A8 processor.

- The WAGO-I/O-SYSTEM always provides suitable interfaces.

- Diverse I/O modules make system ideal for retrofits.

In the R&D department at PSI Technics, positioning systems are simulated using model railroads.

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