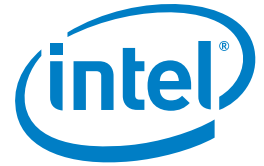


CASE STUDY

Intel® Atom™ Processor E6xx Series
Intel® Platform Controller Hub EG20T
Embedded Computing



Transforming industrial automation

Pilz* chooses Intel® Atom™ Processor E6xx Series for all-in-one motion control system

Innovative industrial automation company Pilz recently selected the Intel® Atom™ Processor E6xx series and Intel® Platform Controller Hub EG20T to power its brand new all-in-one motion control system, PMCprimo DriveP*. Pilz* customers now benefit from a compact motion control system with short cycle times, helping to reduce errors and waste in intricate automated mechanical movements such as filling and labeling packaging; laser marking; and servomechanism press speed, torque and pendulum stroke control. Moving forward, Pilz has made a strategic decision to use embedded Intel® processor technology in all its control and visualization solutions. By doing so, it will be able to reuse its embedded software with future Intel processor generations, enabling faster time to market.



“Enhanced Intel SpeedStep® Technology allows the Intel® Atom™ Processor E6xx series and Intel® Platform Controller Hub EG20T system to dynamically adjust processor voltage and core frequency, which enables us to decrease average power consumption and average operating temperatures for our solutions.”

*Matthias Holzäpfel,
Division Head, Embedded Platforms within
Product Development, Pilz**

Challenges

- **Industrial capabilities.** Pilz needed a high-performance, secure and reliable embedded processor technology to run its new all-in-one motion control system

Solutions

- **Embedded processing.** Pilz selected the Intel Atom processor E6xx Series, together with the Intel Platform Controller Hub EG20T as a result of its superior performance and excellent flexibility to incorporate a wide range of standard and user-defined I/O interfaces.
- **Influencing features.** Enhanced Intel SpeedStep® Technology helps decrease power consumption and heat production; PCI-Express* (PCIe*) allows for high-performance connectivity between the processor and chipset interfaces; and the extended operating temperature range is ideal for industrial automation

Impact

- **Advanced motion control.** Customers benefit from a compact solution with short cycle times and a higher number of axes, helping to lower dissipation and tolerances and, ultimately, reduce costs
- **Safety first.** For the first time, customers will be able to benefit from SafetyNET p RTFL* which offers easy-to-install Ethernet-based connectivity
- **Investment protection.** Pilz is now able to reuse its embedded software with future embedded Intel processor generations, resulting in shorter development cycles and helping it reduce time to market and maintain competitive advantage

Embedded Intel technology shortens product development time at Pilz*

The spirit of safety

Pilz is a family-run, global technology company providing complete solutions for safe automation. It supplies products for control and monitoring and sensor technology as well as automation solutions with motion control and visual and diagnostic systems.

Pilz solutions are used in all areas of mechanical production, from the automotive industry to food and drink production and joinery manufacturing. They are used in a wide variety of scenarios which require intricate mechanical movements and maximum safety guarantees (e.g., ensuring that theater sets move smoothly, that baggage handling systems at airports run safely, and that funicular railways and rollercoasters are secure).

All-in-one motion control

Central to the operation of Pilz's safe automation solutions is fast microprocessor technology that supports industry-standard Ethernet networking and real-time operating systems. Matthias Holzäpfel, division head for embedded platforms within product development at Pilz, explains: "The technology that drives our solutions needs to meet the rigorous performance, security and availability requirements of factory automation. Anything less just won't do."

Recently, Pilz selected the Intel Atom Processor E6xx series and Intel Platform Controller Hub EG20T to power the PMCprimo DriveP, its new all-in-one motion control system.

The PMCprimo DriveP is a combination of a motion control card and servo amplifier, designed for applications with one to 40 axes and high requirements in terms of performance and synchronized

movements. It is designed for use in the packaging industry for processes like filling, cross cutting, fly sawing, labeling and wrapping; in semiconductor manufacturing for laser marking and solder frame handling; and for use in servomechanism presses for position, speed, torque and pendulum stroke control.

Intel® Atom™ Processor E6xx Series

The Intel Atom Processor E6xx series and Intel Platform Controller Hub EG20T offer superior performance and excellent flexibility to incorporate a wide range of standard and user-defined I/O interfaces. Integrated 3D graphics, video encoding and decoding, and memory and display controllers help to reduce component count, reducing material cost and saving board real estate.

Pilz was particularly attracted by a number of features in the Intel Atom Processor E6xx series and Intel Platform Controller Hub EG20T, including Enhanced Intel SpeedStep Technology, open PCIe standards for processor-to-chip interfaces, and the industrial operating temperature range.

"Enhanced Intel SpeedStep Technology allows the Intel Atom Processor E6xx series and Intel Platform Controller Hub EG20T system to adjust processor voltage and core frequency dynamically, which enables us to decrease average power consumption and average heat production," explains Holzäpfel. "By decreasing power and temperature, we will ultimately be able to develop more innovative, smaller form factor designs."

Meanwhile, PCIe – a standards-based, point-to-point, serial interconnect used throughout the computing and embedded devices industries – is enabling Pilz to

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*Matthias Holzäpfel,
Division Head, Embedded Platforms within
Product Development, Pilz**

achieve high-performance connectivity between the processor and its chipset interfaces. In turn, this means that Pilz can design solutions capable of functioning on a higher number of axes. The PMCprimo DriveP, for example, can perform motion and control functions along one to 40 axes.

PCIe pushes the limits of I/O performance boundaries, increasing transfer speeds and enabling greater performance. Intel works with other industry leaders to ensure the PCIe standard is based on a robust specification to ensure compatibility for a multitude of products for years to come.

Finally, Pilz was also impressed by the extended temperature range of the Intel Atom Processor E6xx series and Intel Platform Controller Hub EG20T. "The factories in which our all-in-one motion control system will be deployed are often unconstrained thermal environments – either extremely hot or extremely cold," explains Holzäpfel. "The Intel platform has an extended temperature range from -40oC to +85oC, making it ideal for our industrial automation."

Multiple customer benefits

Thanks to the Intel Atom Processor E6xx series and Intel Platform Controller Hub EG20T, Pilz's PMCprimo DriveP all-in-one system is able to resolve complex tasks in a very short timeframe.

Holzäpfel explains: "The improved processing power offered by the Intel platform means that we have been able to achieve shorter cycle times with the PMCprimo DriveP – just 0.5 milliseconds, compared to our competitors' average of around one millisecond. The new system is also able to function on a greater number of axes, helping to lower dissipation and tolerances for our customers, which ultimately reduces costs."

The PMCprimo DriveP combines motion, drive, and safe controller boards on a single system. This results in a much more compact solution that helps to reduce costs. Since full functionality is contained within a single cabinet, there is no need to purchase three separate systems. The embedded Intel® Atom™ processor technology is key to helping Pilz achieve these compact dimensions.

A field-programmable gate array (FPGA) from Altera, which can be easily connected to the Intel Atom Processor E6xx series via PCIe, enables Pilz to make available various fieldbus protocols, such as CANopen* and PROFIBUS DP. "These protocols make it easy for customers to ensure real-time and reliable distributed control to connect instruments and machines in their manufacturing plants. The overall result is a system that can be easily and reliably controlled," says Holzäpfel.

The onboard FPGA is also going to enable connectivity to Pilz's Ethernet-based industrial fieldbus system, SafetyNET p RTFL, making the PMCprimo DriveP the first solution to offer this interface. Pilz developed SafetyNET p in response to new challenges in automation technology – namely, the move away from centralized control systems with simple, bit-oriented sensors and actuators towards distributed systems with more sophisticated sensors and actuators that involve an ever-increasing amount of on-board pre-processing.

"Ethernet offers ideal the communication medium in this instance," says Holzäpfel. However, up until now commercial-grade Ethernet systems have still been quite complex and difficult to work with compared to industrial fieldbus systems. SafetyNET p is a modern Ethernet-based alternative that can support modern, distributed systems while still being easy to install. Thanks to the new Intel

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platform, our customers are able to benefit from SafetyNET p for the first time.”

The ability to exchange units quickly, in order to minimize downtime, is a key requirement in industrial automation. The versatile interface that the Intel Atom Processor E6xx series and Intel Platform Controller Hub EG20T offer made it easy for Pilz to incorporate this feature. The PMCprimo DriveP can be exchanged without needing to know the required configuration data required to run the system, since it gets its configuration automatically from the servo amplifier.

Looking to the future

Until the development of the PMCprimo DriveP all-in-one motion control system, Pilz had only used embedded Intel processor technology in one of its performance-intensive products – the SafetyEYE* safe camera system.

SafetyEYE enables uninterrupted, three-dimensional monitoring and control of danger zones in the automotive, aerospace, and packaging industries and can also be used with machine tools and handling systems. It detects and reports

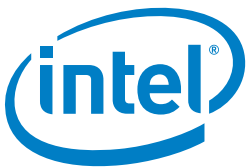
objects that encroach into warning and detection zones, ensuring high safety standards. Pilz relies on Intel® Core™ i5-2500 Processor to drive the operation of SafetyEYE.

Traditionally, Pilz used a range of microprocessors from almost every manufacturer. However, based on its experience of using embedded Intel processor technology in its SafetyEYE and PMCprimo DriveP solutions, Pilz has made the strategic decision to use Intel® architecture in all its future development projects around control and visualization systems.

Holzäpfel explains: “An important advantage to Pilz is the ability to cover different performance classes with only one processor architecture. In addition, the long-term availability of the processors and the high market penetration of Intel’s offering are important to Pilz, the latter ensuring ready availability of a variety of drivers and board support packages. Furthermore, we expect shorter development times and more cost-effective, efficient research and development processes, as we are able to reuse our existing embedded software with future embedded Intel processor generations.”

Spotlight on Pilz

Pilz is a leading, innovative automation technology company. An expert in the safety of workers, machines, and the environment, Pilz provides worldwide, customer-oriented solutions for all industries. These include innovative products in the areas of sensor, control and drive technology. Pilz currently employs more than 1,500 staff worldwide. In addition to its head office in Germany, Pilz is represented by 28 subsidiaries and branch offices on all continents. To find out more, visit: www.pilz.com



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