C6670 industrial server – fully leveraged by TwinCAT 3.1 for maximum performance levels

Many-core control: Easily distribute numerous complex functions in a control system with up to 256 processor cores

“Many-core controllers” will play a central role in the future of machine control and in the realisation of Industry 4.0 concepts. To meet the rising requirements of Smart Factories, with their increasingly intelligent machines and production systems, high-performance controllers such as the Beckhoff C6670 industrial server are becoming indispensable. To make effective use of this immense computing performance, however, powerful software support, such as that provided by the TwinCAT 3.1 automation platform, is a necessity.

Many-core computers differ from conventional Industrial PCs in their architecture. They feature several processors, also referred to as “packages”, and each is equipped with multiple cores. Their memory architectures also provide a notable difference. One technique, known as NUMA or non-uniform memory access, provides each processor with its own dedicated memory. Beckhoff has implemented this design with its C6670 industrial server featuring two Intel® Xeon® packages, each offering 6, 12, or 18 cores and from 64 to 2,048 GB of RAM.

This immense computing power can only be utilised effectively, however, if the performance of each core is fully leveraged by TwinCAT 3.1 software. The flagship control software from Beckhoff is capable of mapping the various machine and process workflows –

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highly suitable for parallelisation and distribution of different tasks as function modules.

Easy modularisation and user-friendly diagnostics

With TwinCAT, users can implement individual automation tasks in the form of modules. Written in PLC or C++ code, these machine modules are assigned to individual tasks within the TwinCAT system and executed in user-defined cycles. The tasks can then be simply distributed over the real-time cores. To intelligently define the execution sequence, the individual tasks can be prioritised.

Critical for reaching the highest level of system performance, the diagnostic functionality of TwinCAT 3.1 analyses the load of each core individually. Cores can also be assigned exclusively to the TwinCAT runtime process, in which case they are referred to as “isolated” because they do not execute any Microsoft operating system functions along with the TwinCAT real-time system. This makes it easy to separate Windows processes from real-time processes.

Support for up to 256 processor cores

Since TwinCAT 3.1 was designed for up to 256 processor cores, it provides a future-proof solution, offering the ability to run automation applications on the complete spectrum of currently available processors. Depending on the amount of computing performance needed, the system designer can configure the appropriate number of cores for the respective real-time applications.

➔ www.beckhoff.com/many-core-control

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Together with TwinCAT 3.1 automation software, the C6670 industrial server from Beckhoff provides the ideal platform for integrating Condition Monitoring and energy management functions into the control system. Coupled with options for adding PLC, Motion Control, robotics and CNC functions, the C6670 is well-equipped to meet the demanding requirements of Smart Factory and Industry 4.0 applications.

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Please send readers' questions regarding “Many-core control” to:

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