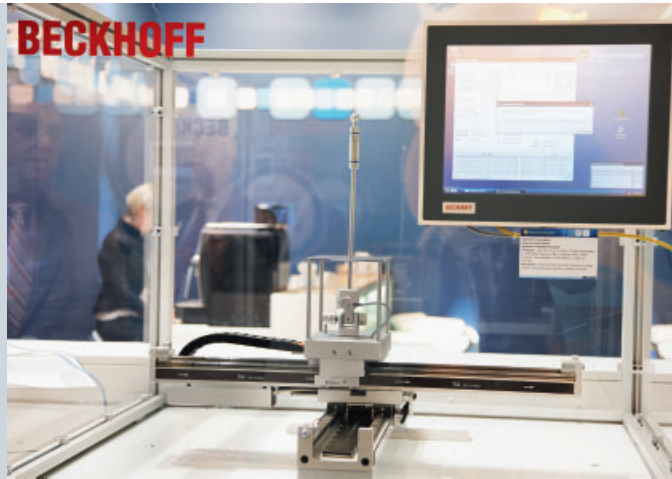


Windows CE 6.0 as a hard real-time embedded platform

Beckhoff implements Schtick pendulum for Microsoft



The Schtick pendulum on the Microsoft Embedded booth at the 2009 Hanover Fair

The real-time capability of Windows CE 6.0 is impressively demonstrated using the Schtick pendulum commissioned by Microsoft. The inverse pendulum is balanced on two electrical drive axes in the x/y planes and kept vertical by a Beckhoff Embedded PC CX1020. The compact fanless controller, equipped with Windows CE 6.0 R2 as operating system, Intel® Celeron® processor and 256 MB DDR RAM calculates both the PLC and Motion Control with a cycle time of 500 µs. Besides the cyclical control of the drive axes, the PLC also calculates a monitoring system: a traditional control scenario to determine missing parameters from a parallel system. The I/Os and servo drives are controlled using EtherCAT.

In order to make the control system as robust as possible for use on the machine, the database information is stored on a hard disk. The Schtick demonstration comprises three devices with different operating systems: the CX1020 controller with Windows CE 6.0 R2 for controlling the inverse pendulum, a CP6203 Ethernet panel with Windows Embedded Standard as operating station and a device with Windows Embedded Server 2008 for data storage in an SQL database. Web Services on Devices (WSD) from Microsoft was implemented for communication between the three devices. WSD is available in all Microsoft operating systems. Devices in the network can recognize each other automatically and be operated using plug and play,

without any additional configuration. The CX1020 simply scans through the network for a device with database function. As soon as it has found this, a type of small handshake takes place and the data are stored asynchronously by the PLC in the database. The Control Panel loads the Windows Embedded Server 2008 web page into the browser and calls up the data from the server using WSD.

The Beckhoff CE system uses approx. 20 % of the available CPU capacity for controlling the inverse pendulum, including the monitoring system and communication tasks. This means that the CPU still has enough available capacity in order to process further tasks centrally. Microsoft exhibited the demo pendulum to the public for the first time at its trade booth at this year's Hanover Fair. The centerpiece of the demonstration was the scalable range of Microsoft operating systems and their main application areas and interactions. Since then, the Microsoft Embedded product team from Redmond has presented the Schtick pendulum at the TechEd US international development conference and demonstrated the technology in lectures in cooperation with Beckhoff. The pendulum made such an impression that Intel has now also ordered a demo system from Beckhoff in order to demonstrate the high performance of the Intel® Atom®-based controller CX5000.