sercos news

the automation bus magazine

Perfect
Harmony in
Real-Time

Innovative sercos® III
Control Solutions for Varied and
Demanding Automation Tasks

Cost-Effective
Blended sercos® III and
EtherNet/IP Infrastructure

Interactive
"Smart"
Handheld Operator

Open
Drive Profile
for sercos® III

Dear Readers,

Peter Lutz,
Managing Director of
sercos international e. V.

Studies have shown that machine and plant engineers want a universal, continuous Ethernet network to cover their requirements. This is what sercos® offers!

In addition to controls and drives, the product and supplier spectrum for our technology comprises a wide array of peripherals such as decentral I/Os, safety components, encoders, camera systems, and sensors, as well as hydraulic and pneumatic components.

This is why leading machine and plant engineers in diverse industries have come to rely on sercos III. On the one hand, users rely on automation solutions of full-range suppliers. On the other hand, they implement own control solutions. Machine and plant builders benefit from the high level of standardization of sercos, which allows the easy integration of third-party devices.

We have thus devoted the current edition of sercos News to the topic of control systems. Selected solutions will be presented on the following pages. And, as usual, the current edition also contains further interesting topics on sercos the automation bus.

Have fun reading!

S Contents

sercos on YouTube

sercos international now has its own channel on YouTube, offering videos on a variety of hot topics in the automation and machinery industries, as well as interviews, trade fair videos, and introductory profiles on member companies. The new, expanded online presence is rounded off by live videos demonstrating the automation bus in action, including some very unique applications. Videos are available in both German and English. The channel also includes a playlist with English and language-independent films. To stay on top of the latest video additions, viewers can subscribe to the sercos YouTube channel. ■

**Ilona Arnold,
Marketing Manager of
sercos international e. V.**

New Marketing Manager

sercos international has appointed Ilona Arnold as its new Marketing Manager. In addition to e-mail marketing, events, media management, and public relations, her main tasks will be in the area of brand strategy and the expansion of global marketing activities. Ilona Arnold has gained many years of experience in marketing, PR, and lead management in various industries. She completed her Master of Business Administration (MBA) parallel to her job in Great Britain. ■

sercos international
Strengthens
Its Worldwide Presence

The user organization will present its product and service portfolio together with its members at more than 20 events this year.

Besides exhibiting at major shows, sercos will present at country-specific events and conferences to display the latest developments and innovations in automation. This also includes the SPS/IPC/Drives Italia in Parma, from May 21–23, 2013, the Industrial Automation Show in Shanghai, China, from November 5–9, as well as the System Control Fair in Tokyo, Japan, from November 6–8.

sercos will also provide technical seminars for developers, product managers, and users who are interested in gaining either a general overview of or detailed insights into sercos® technology.

The next seminar (sercos Technology Forum) will take place on May 14, in Stuttgart. Further information can be found on our website.

The sercos User Conference will be held on September 24, in Frankfurt, Germany. This conference is designed for current and potential users with a stronger technical background from the machinery and automation industries, as well as system integrators. It offers various presentations in the morning followed by different afternoon sessions, so that visitors can customize their own conference experience.

For the first time, the user organization will also offer webinars. These online events enable attendees to gain more knowledge about sercos and its technology – an inexpensive option that also eliminates travel expenses. ∎

EVENTS 2013

March

SIAf Industrial Automation fair:
3/4 - 3/6/2013, Guangzhou - China

MC4:
3/5/2013, Bologna - Italy

swissT.meeting
Communication Conference:
3/12/2013, Windisch - Switzerland

Automation Summit 2013:
3/20 - 3/22/2013, Böblingen - Germany

April

Hanover fair 2013:
4/8 - 4/12/2013, Hanover - Germany

May

sercos® Technology forum:
5/14/2013, Stuttgart - Germany

11. Plugfest:
5/15 - 5/16/2013, Stuttgart - Germany

SPS/IPC/Drives Italia 2013:
5/21 - 5/23/2013, Parma - Italy

June

Industrial Automation 2013:
6/26 - 06/28/2013, Peking - China

July

Industrial Open Network (ION)
Roadshow:
7/9/2013, Osaka - Japan
7/7/2013, Tokyo - Japan

September

sercos® User Conference:
9/24/2013, Frankfurt a. M. - Germany

November

Industrial Automation Show:
11/5 - 11/9/2013, Shanghai - China

System Control fair 2013:
11/6 - 11/8/2013, Tokyo - Japan

SPS/IPC/Drives 2013:
11/26 - 11/28/2013, Nuremberg - Germany

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Communications Infrastructures for the Automation Industry – How Much is Enough?
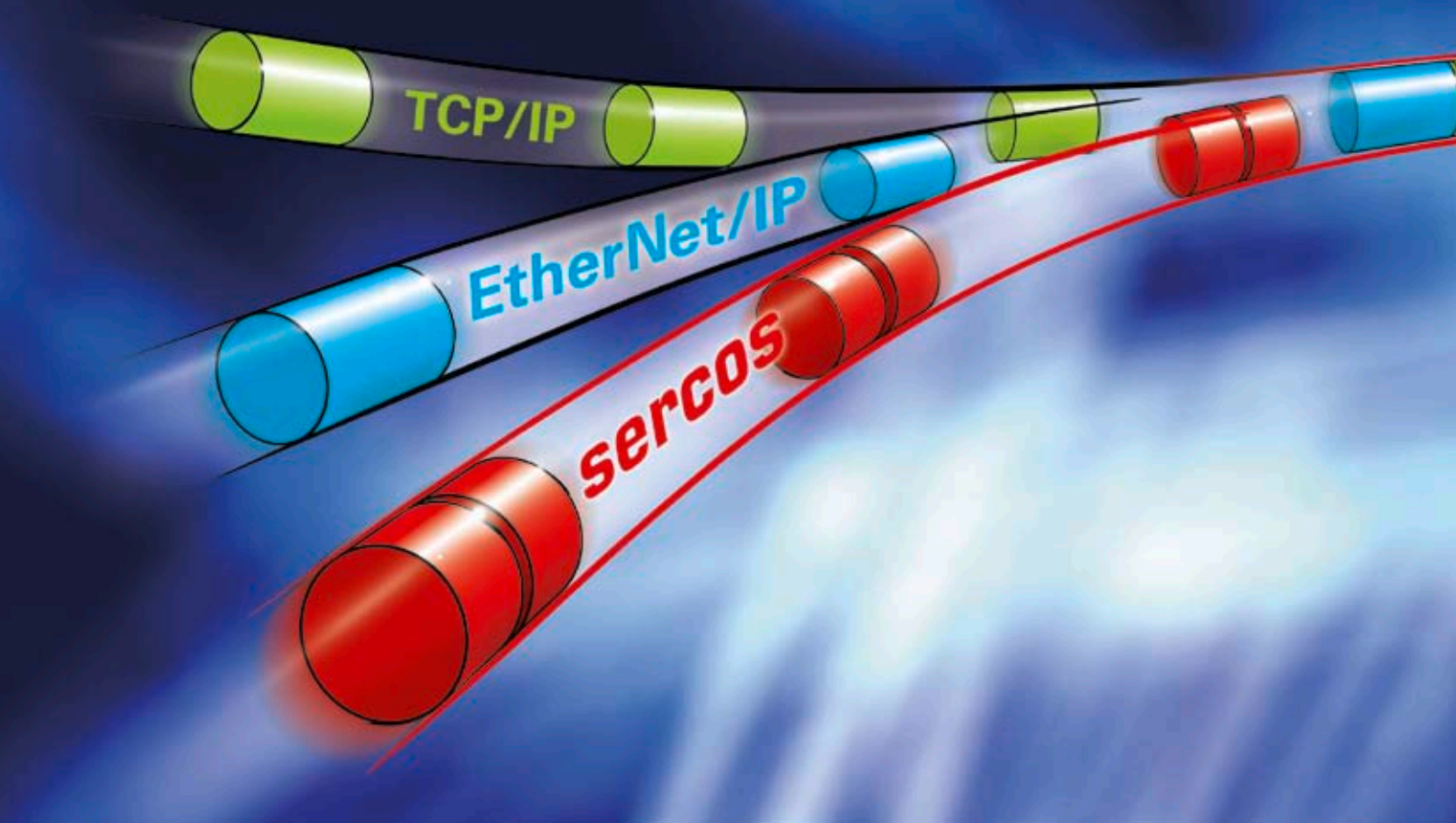
Do users really need a common sercos® III and EtherNet/IP infrastructure on top of other options? What benefits does a blended infrastructure offer and for which applications could it be useful? sercos international e.V. interviewed Peter Lutz, Managing Director of the user organization, to find out more.

sercos international e. V.: *Mr. Lutz, what exactly is a blended infrastructure?*

Peter Lutz: A blended infrastructure means that various sercos III and EtherNet/IP devices use a common Ethernet infrastructure on a single cable. These devices can coexist in the same network environment, so that sercos telegrams, CIP messages, and TCP/IP telegrams all run on one cable. The joint use of the network has no impact on the real-time behavior of the different protocols. The protocols remain fully functional; the only thing they share is bandwidth. For most applications this does not result in any restrictions, because 100 Mbit/s full-duplex Ethernet provides ample bandwidth.

sercos international e. V.: *What were the drivers for the development of a blended infrastructure?*

Peter Lutz: This development was driven by an increasing number of requests from industry players. All the real-time Ethernet standards available today have areas of strength where they are supported, and many products are available for users. A single bus may not be the perfect solution for all project requirements, meaning that users often need to

ore

tively complements our own portfolio by including general-purpose devices available for EtherNet/IP from other manufacturers. There are a wide variety of actuators and sensors used in the general automation and process industries, for example, which are only used occasionally in application areas where sercos dominates. With a blended infrastructure, those devices can now be used in all application areas.

sercos international e.V.: What are the benefits for machine engineers and users?

Peter Lutz: The great variety of automation technology in today's world requires a new conceptual approach to simplify the integration of machinery in manufacturing. A common network infrastructure like ours enables machine engineers and users to reduce the cost and complexity of integration. This results in easier and faster machine implementation and makes this process even safer. At the same time, engineers and users retain the ability to utilize their preferred product suppliers and automation devices, effectively eliminating the need to search for new suppliers or consider different automation devices.

sercos international e.V.: Is there already a timeline for availability?

Peter Lutz: The great advantage of a blended infrastructure is that sercos III and EtherNet/IP devices can coexist in the same environment without the need for any device modifications. Simply following a few clear and easy installation rules is basically the only requirement. One very interesting application is a single controller with concurrent support for sercos III and EtherNet/IP (dual-stack master). Prototypes of such controllers from Bosch Rexroth and Schneider Electric – each connected to various sercos III and EtherNet/IP devices – were shown as part of the first blended infrastructure systems during the SPS/IPC/Drives exhibition in November in Nuremberg. Because the prototypes are already available, we expect to see the first products in the coming months.

sercos international e.V.: Thank you for this interview! ■

Peter Lutz,
Managing Director of
sercos international e.V.

include multiple network buses in their designs. In these cases, users want to minimize physical and structural equipment cabling to reduce overall costs, streamline processes, and maintain high-level safety standards. We have been collaborating with the ODVA to meet these requirements since last April, and this blended infrastructure is one of the first results of the Machinery Initiative, a joint effort of sercos international, ODVA, and the OPC Foundation.

sercos international e.V.: Why is a blended infrastructure so important to sercos?

Peter Lutz: sercos is an automation bus, designed for applications that require high speed in combination with high precision. The blended infrastructure approach effec-

Bihl+Wiedemann
Goes for Safety

sercos international spoke with Johanna Schüßler, Product Manager at Bihl+Wiedemann, about new sercos®-capable solutions and the importance of safe cross-communication.
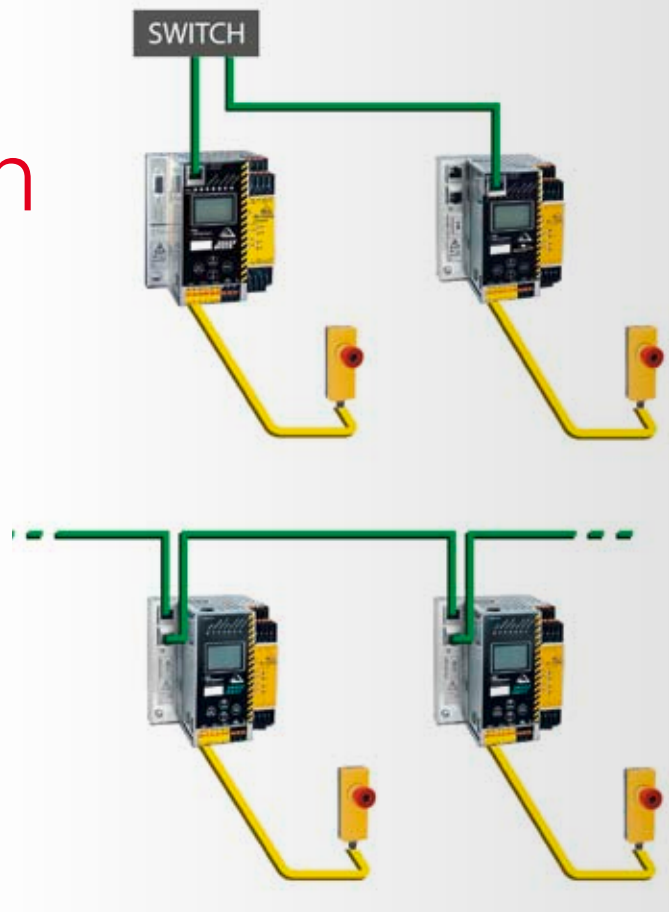
Johanna Schüßler, Dipl.-Ing [BA],
Product Manager at Bihl+Wiedemann GmbH
in Mannheim, Germany

Safe cross communication via an Ethernet-diagnostic interface (top) and fieldbus interface

sercos international e.V.: Ms. Schüßler, at SPS/IPC/ Drives 2012 in Nuremberg, Germany, Bihl+Wiedemann announced that it would be launching a CIP Safety solution for sercos this year. What is the current development status?

Johanna Schüßler: Our development department is hard at work on the implementation of the CIP Safety protocol in our AS-i sercos gateway with an integrated safety monitor. We are currently planning to present the first devices in the next few weeks.

sercos international e. V.: What motivated the company to develop this solution?

Johanna Schüßler: AS-Interface is a wiring system at the base of the automation pyramid which transmits secure and unsecure data and energy on a single cable. We started out as a specialist for AS-i masters, because we were and still remain convinced that the networking of actuators and sensors via this type of interface is actually the best thing that can happen to users. To make sure that its advantages can be used in as many automation systems as possible, we have developed gateways and safety gateways for all commonly available fieldbuses – including sercos, PROFIBUS, PROFINET, and EtherNet / IP.

Bihl+Wiedemann's portfolio also contains AS-i gateways to PROFIsafe via PROFIBUS and PROFINET to connect AS-i to a secure PLC. For us, developing a CIP Safety sercos gateway was the next logical step.

sercos international e.V.: Before you moved to product management, you were active in developing Safe-Link – a solution that enables the networking of safety technology on systems that work with a wide variety of controllers. How does this solution work?

Johanna Schüßler: SafeLink from Bihl+Wiedemann makes it possible to create a safe, Ethernet-based network of between 2 and 31 state-of-the-art safety gateways used in different systems and with a variety of controllers. Networking is either accomplished via the Ethernet diagnostic interface or the fieldbus interface of the gateways. At full capacity, this enables the collection of nearly 2000 safe two-channel input signals and the centralized or decentralized control of almost 1000 safe outputs. Based on the "all hear all" principle, our gateways automatically exchange values and provide this data to the safety program. SafeLink functions according to the black-channel principle. We based our special protocol on standard Ethernet and it

checks data packages both in terms of content and timing. Communication is based on multicasts so that all gateways can "hear" transmitted data at the same time, immediately process this information, and react accordingly.

sercos international e. V.: *How fast is SafeLink?*

Johanna Schüßler: The cycle time always depends on the number of gateways involved. With up to eight devices, the cycle time is about 60 ms; with up to 16 devices, about 90 ms. That's more than sufficient for the majority of cases, since SafeLink is only used for the high-level exchange of safety information. If extremely short reaction times are required, this is accomplished in the respective safety monitor or via pre-processing directly in the slave. When this is the case, switch-off times of 5 ms are possible.

sercos international e. V.: *Can SafeLink be subsequently installed with a firmware update?*

Johanna Schüßler: Basically, yes. SafeLink doesn't require any special hardware.

sercos international e. V.: *Let's talk about costs. With your Safety Basis Monitor, just a few I/Os already justify switching to AS-i Safety. What is the threshold for your gateways with SafeLink and when would it be more economical to switch to a Safety PLC?*

Johanna Schüßler: From a functional perspective, it usually makes sense to switch to a Safety PLC if there are complex safe drives in a system. These types of configurations demand a safe controller that can also process the rest of the safety program. In general, the safe signals need to be collected at the periphery – in the future this will ideally be done via a CIP Safety gateway from Bihl+Wiedemann.

Then users will continue to benefit from the advantages of AS-i technology, such as simplified cabling and installation. This also eliminates the need for remote I/O stations or control cabinets, which would have to be wired in parallel. Users can connect the field modules directly to the yellow cable. This is why it makes sense to use AS-i Safety in a CIP Safety system, even for the lowest field level, and especially in combination with standard AS-i components.

sercos international e. V.: *What applications have you already been able to implement with SafeLink?*

Johanna Schüßler: Our applications are at work in a variety of industries. The range extends from two gateways to 30 gateways communicating via SafeLink. In one exceptional case, we even achieved a solution with 70 gateways, distributed on four managers, which also operates perfectly smoothly.

sercos international e. V.: *Motion control with safety is becoming more common in many industries. Doesn't Bihl+Wiedemann need to offer its own Safety PLC to tap into this market potential?*

Johanna Schüßler: Our Safety Monitor is already very good when it comes to doing the work of Safety PLCs.

sercos international e. V.: *Does that mean you've reached the finish line?*

Johanna Schüßler: No, I think that we'll always enjoy the race. We maintain close contact with our customers and let their feedback and reference data guide our developments. But we have taken a pretty big step ahead with SafeLink.

sercos international e. V. *Thank you very much for this interview.* ■

AS-i 3.0 sercos gateway with integrated safety monitor and safe Ethernet-based cross communication

Perfect
Harmony in
Real-Time

The increasing variety of suppliers opens up additional application areas for sercos®-capable controls

Control technology is considered one of the most important drivers of innovation for machine and systems engineering. In recent years, various trends have been instrumental in the development of control systems: the fusion of PLC and motion controls, the integration of safety functions, the growing intelligence of decentral peripheral devices and the replacement of specific field buses with universal real-time Ethernet solutions.

A wide range of control solutions from various manufacturers are available on the market for the sercos III automation bus. They choose sercos because it provides a powerful, versatile and manufacturer-independent bus system that is constantly adapted to new demands and requirements. What's more, sercos has gained wide acceptance with market and technology leaders in numerous automation technology industries.

In addition to manufacturers who provide complete automation solutions, there is a variety of smaller manufacturers who offer specific control solutions. The high degree of standardization of sercos in combination with a diverse range of products and suppliers enables machine and system manufacturers, manufacturers of control systems, and system integrators to combine automation devices from various manufacturers with minimum engineering effort.

sercos III controls range from drive and controller-based controls to PC-based control systems. Among these controls, a distinction can be made between those with dedicated sercos III hardware (sercos III hard master) and those that use a standard Ethernet controller (sercos III soft master). We present a few selected solutions on the following pages.

X-GO Logic Control

With SYBERA's X-GO software for Windows (32 and 64-bit), users can control sercos III devices from a standard PC (e.g. laptop), with no need for additional controller hardware, and support for over 70 standard Ethernet chips. X-GO controls fieldbus devices under real-time conditions, making it an ideal solution for drive controllers. The X-GO Logic Control software package can be used to initialize, parameterize, and diagnose fieldbus devices. This eliminates additional tools for device operation. X-GO provides comprehensive administration functions for all fieldbus stations.

In addition to a station monitor that displays the current input and output states, a complete PLC language package is also available. Users can focus on the logical processing of user data without the need to attend to protocol-specific details. Various commands are available for timers, counters, and conditional jumps, as well as evaluating

constants and station values. A script checker also checks entries for logical errors. Time sequences for variables are shown in the graphic display. A separate programming interface is available for further processing of user data.

Technology

In addition to implementing the complete sercos III protocol stack, the SYBERA master also focused on achieving the critical cycle timing of the sercos III protocol management with X-Realtime technology for Windows (32 and 64-bit). The system is based on four real-time tasks for sending and receiving Ethernet frames, as well as functional processing. Functional synchronization of the tasks takes place via a STATE machine. Dynamic jitter compensation is used to balance out additive jitter as well as dynamic drift in the master cycle. Depending on the platform, a stable jitter behavior below 5 microseconds can be achieved. The master stack implements sercos III protocol management, as well as troubleshooting and device logistics. The protocol stack creates the connection between the physical transport layer and the application software. Flexible IDN parameterization simplifies the adaptation of sercos III devices to X-GO Logic Control.

The sercos III master from SYBERA permits both linear and ring topologies. The latter require a second standard Ethernet adapter.

Complete Success at sercos III PlugFest in Stuttgart, Germany

At the sercos III PlugFest in Stuttgart, Germany, SYBERA made a strong showing with its PC-based sercos III master for Windows and a demo featuring 32 coupled sercos III modules from Hilscher. X-GO Logic Control can be used for both I/O devices and drive controllers and is therefore an ideal solution for diagnostic functions and mini controllers. ■

TwinCAT 3
Speaks
sercos® III

Figure 1:
The sercos bus system in action at the German Pavilion at Expo 2010 in Shanghai, China. By making loud noises, visitors to the German pavilion at EXPO 2010 Shanghai, China can set a sphere on the end of a pendulum in motion. Clad with 400,000 LEDs and measuring three meters in diameter, the sphere delivers a scintillating flood of images to match its movements.

PC-based control technology provides a high level of flexibility and scalability. When combined with a high-performance, open fieldbus system, it enables a wide array of automation options, ranging from simple to demanding applications in machine and plant engineering. The TwinCAT control platform from Beckhoff is a real-time software solution that runs on Windows with PLC and motion control functions. It has been on the market for over 15 years and is often purchased together with the company's EtherCAT bus system. Nonetheless, third-party bus systems can also be easily integrated in the TwinCAT system using suitable interface cards and driver software.

Active and passive PCI plug-in cards from various manufacturers are available for both the fiber-optic sercos II drive bus and the Ethernet-based sercos III automation bus (e.g. CANNON-Automata, Beckhoff, Bosch Rexroth).

The TwinCAT control platform is also very flexible in terms of integrating user control codes. Controllers designed in Matlab, for example, can be executed directly in the control system in Matlab, ANSI C, or C++ code. In addition, entire applications can be connected to the controller (e.g. 3D simulation software or tools for the virtual commissioning of machines or systems). Combined with a high-performance, realtime-capable, open bus system, as well as connected controller peripherals, highly demanding automation solutions can be implemented with ease and a high level of reliability. Simple commissioning, short cycle times, and practical diagnostic options are some of the main features. With sercos III, the automation bus, these requirements have already been met for years – and tried and tested in numerous applications in a wide variety of industries.

In order for TwinCAT 3 to "speak" the sercos III language, one option is to integrate an active sercos III master card from Bosch Rexroth in TwinCAT 3. With
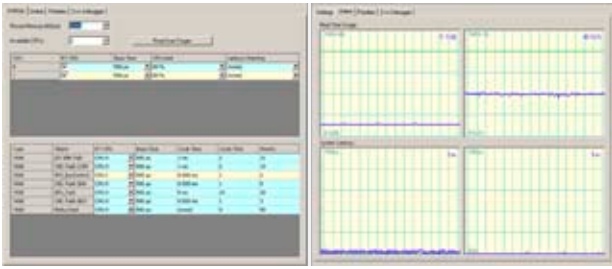
Figure 2: Performance measurement for sercos III in TwinCAT 3

the right driver software, the sercos III communication services can be used via a PLC interface or even a C++ programming interface. Acyclic communication – also known as the service channel – enables on-demand access to data on sercos III bus participants. Variables are read and written acyclically via this interface. In addition, these mechanisms can be used to start up the automation bus and establish connections between individual participants.

An interface can also be provided for cyclic communication, which enables deterministic data exchange between bus participants in the sercos III network at configurable intervals. This makes it possible, for example, to transmit cyclic information from the TwinCAT 3 CNC or a user application to the bus participants (e.g. target position) or to receive this information (e.g. actual position). The sercos III bus and a PLC master task are synchronized by a lifecounter in the sercos III master card. The PLC master task synchronizes all further TwinCAT 3 system tasks, such as the CNC application. A lack of synchronization by the master PLC task would cause TwinCAT 3 tasks to "shift", resulting in set point failure. The PLC master task is also responsible for toggling sercos III connections at the configured intervals, thus ensuring the stability of sercos communication. The PLC master task is also responsible for data management. In this case, data management means that incoming data are distributed to the corresponding applications, such as the CNC application, and data that need to be sent are also transmitted in the respective sercos III telegrams.

The sercos III connection design was validated with a 5-axis machine as an example. This solution utilizes both cyclical and acyclic communication services. The error counters on the installed sercos III devices could not detect any telegram errors. The TwinCAT 3 control

also did not exhibit any errors after connecting the CNC controller on the 5-axis machine, which could be operated without any difficulties. The CPU usage for the PLC master task was 40% with a cycle time of 500 µs (see Figure 3).

The relatively high processor workload was primarily due to the inefficient use of resources by TwinCAT 3 on the PCI storage areas of the sercos III master card. Tests showed a significant performance increase when the quantity of simultaneously accessible data via the acyclic channel was reduced. If acyclic sercos communication is not required during system operation, switching off the acyclic service can considerably enhance performance. ■
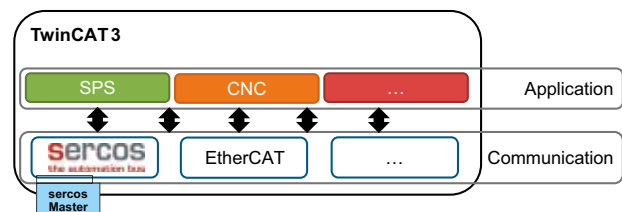

Figure 3: Concept for sercos III in TwinCAT 3

Drive Profile for sercos® III

'Access Code'
for Third-Party products

PacDrive 3 is Schneider Electric's open standards-based automation solution for machines with motion and robotic control functionalities

sercos is the real-time Ethernet solution with a proven drive profile. Schneider Electric is a well-known user of sercos communication, and has integrated the drive profile into its PacDrive 3 system. The benefit for users is clear, namely the ability to more easily integrate third-party products into PacDrive's sercos communication system.

Automation trends have long been moving toward making complete solutions available from a single source. In machine building, these trends have produced a wide range of bus-capable drive technologies. Ultimately, however, every leading vendor of automation solutions works within the limits of its portfolio in terms of the performance and variety of its drive technologies. These limits are determined by the company's focus on its individual target industries. There are also a number of innovative, small third-party specialists on the market who have created strong niches for themselves by offering bus-capable drive components. Torque drives and linear drives are particularly good examples of such components.

Integration: Until now, a question of costs

Integrating third-party products through the use of popular field bus interfaces is one common way to fill gaps in a product portfolio. Such integration generally requires a great deal of implementation effort, however, particularly on the software side. This effort is multiplied when integrating third-party products into synchronized multi-axis systems.

The only way to reduce this effort and the associated costs is to ensure that system vendors and third-party vendors

A typical example of a third-party component from an innovative specialist: Stainless steel linear motors from the PR01 series by LinMot (Photo: LinMot)

maintain the field bus communication standard for their products. The protocols of Ethernet-based field busses, which are the most well-known and widely accepted, are publicly available. What is still lacking in many cases, however, is a precisely defined drive profile. Such a drive profile is essential for integrating third-party drive products into the communication system. This situation has been significantly improved in sercos III because the TWG Drive working group of sercos international e.V. has defined just such a profile, known as the 'Function Specific Profile Drive,' and adopted it as the standard.

Schneider Electric, as an international provider of automation solutions and a defender of open standards, has fully implemented this drive profile in its PacDrive 3 automation solution. PacDrive 3 is one of the world's leading logic motion control solutions for synchronous operation of 2 to 99 servo drives or multi-robot applications. sercos III acts as an 'automation bus' in PacDrive 3, integrating drive communication as well as I / O and safety communication in a shared medium.

"At 3S, there was never any doubt that we would implement sercos III in our CoDeSys system. We have had very good experience with sercos II. The excellent level of drive profile standardization allows us to operate devices from a variety of manufacturers without time-consuming drive development or modification."

Manfred Werner

Manfred Werner, board member of 3S-Smart Software Solutions GmbH

High-quality solution

The sercos drive profile was implemented in the core system component, the LMC controllers. These controllers have been officially certified by sercos international e. V. and can communicate via sercos III with any third-party drive that meets the standard of this drive profile. With this innovation, an entire series of products from third-party manufacturers can now be integrated into PacDrive solutions with the sercos III interface (and the drive profile!). Offerings on the market include servo drives above and blow the range of 2 to 50 A nominal current / 6 to 130 A peak current covered by the PacDrive servo drives, as well as stepper solutions and of course linear and torque motors.

Manfred Werner, board member of 3S-Smart Software Solutions GmbH, describes the quality of sercos integration by third-party vendors using the drive profile: "At 3S, there was never any doubt that we would implement sercos III in our CoDeSys system. We have had very good experience with sercos II. The excellent level of drive profile standardization allows us to operate devices from a variety of manufacturers without time-consuming drive development or modification. sercos III already provides the basis for uncomplicated, reliable, fast, synchronous drive data transfer. We believe that it offers us and our customers very significant advantages."

Small actuator by LinMot now also integratable

This has been Schneider Electric's experience as well, for example with the 72 V LinMot drives. Although LinMot's large actuators could be operated in combination with the PacDrive Lexium 62 servo drives, there was still no easy solution for integrating small actuators into PacDrive systems. But that has all changed now: Every actuator that can be operated in combination with the E 1200 servo drives from LinMot can now be easily and quickly integrated into PacDrive's sercos communication. The system recognizes the LinMot servo drives and maps them in the controller configuration of EPAS, the SoMachine programming tool. Once this is done, the user simply needs to assign a device ID and a vendor code, and the integration is complete. From an engineering perspective, this removes any differences between these drives and standard PacDrive components. ∎

Whether with the resistive touchscreen or the membrane keyboard and high-precision handwheel, all input options on the COP HT50 handheld operator are transmitted to the higher-level central controller in real time.

"Smart"
Handheld Operator

The perfect human-machine interface: combined in a single handheld operator, the realtime fieldbus systems sercos® III and EtherCAT allow users to connect to controllers from a variety of manufacturers.

With its a 5" touch display and handwheel, the new COP HT50 offers optimal handling, from setting up robotics equipment and processing machines, to approaching workpieces, up to tweaking and teaching in CNC programs. With this handling set (operator and gateway), developers at Schleicher Electronic GmbH & Co. KG have set a new benchmark in the field of handling systems. Peter Brinkmann, Vice President Research and Development and authorized signatory at Schleicher Electronic, explains in "Konstruktion & Entwicklung" what his company's new operator can do and what users can expect from the new device.

Real-time commands – straightforward operation

The operator from Schleicher Electronic enables EtherCAT or sercos III-based communication with the machine control via a flexible 5-meter coiled cable.

"The interface can simply be selected using a switch on the gateway module of the handheld unit," says Peter Brinkmann explaining the user-friendly option to choose

Peter Brinkmann: "With the growing complexity of equipment, our customers are increasingly seeing the need to replace the previous mobile handwheel solution with an intelligent touchscreen device. Our current solution can be used to control the entire machine."

between the two interfaces. The COP HT50 is equipped with a robust membrane keyboard that features a real-time transfer of key commands to the control, as well as a high-resolution handwheel with 100 increments per revolution. The handy dial and high-precision incremental detent mechanism of the handwheel are the key ingredients behind this sensitive and accurate control. Handwheel data are also transmitted in real time. According to Peter Brinkmann, this enables jerk-free machine movements.

Robust touchscreen as a control element

Information is visualized on a bright high-resolution 5" monitor with LED backlighting. Peter Brinkmann

comments, "The 480x800 pixel screen resolution (portrait format) not only provides fast visual information, but also serves as a control element. The resistive touchscreen can even be operated by users wearing gloves." The powerful, clearly structured user interface of the high-quality and robust operator unit permits both fast and flexible operation.

Visualization via Web browser

As an additional special feature, the handheld operator also provides browser-based visualization with an integrated Web browser. "The Web visualization option features a comprehensive function library. All standard visualization functions can thus be executed quickly and easily," Peter Brinkmann explains, while highlighting an additional advantage of this concept: "The visualization data are not stored on the handheld unit; instead, individual visualization projects are located in the mass storage of the controller (server), which permits quick access. Updates can be performed very easily, and it's also no problem to unplug the unit and insert it into a different machine. The full visualization starts up immediately."

Integrated light source and safety

One special highlight, in the truest sense of the word, is the LED flashlight on the handheld operator, which can be used to selectively illuminate work areas. When it comes to safety, the practical unit is equipped with a dual-channel emergency OFF button in accordance with DIN 60204 and also has a connec-
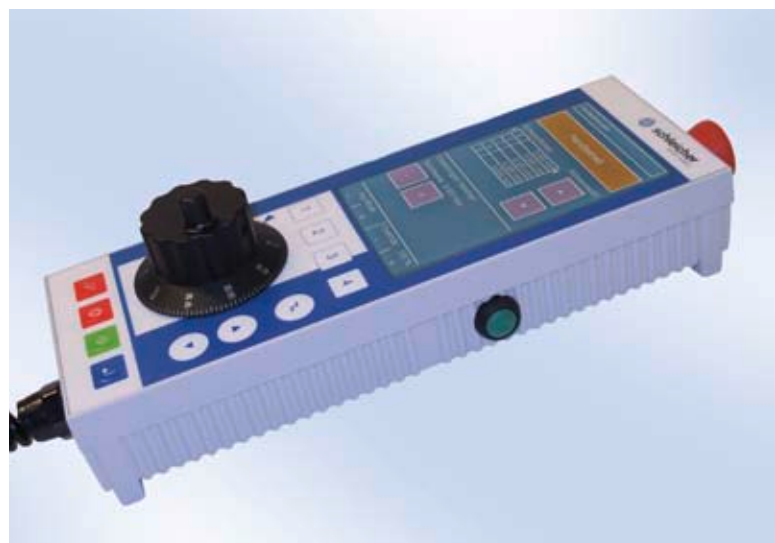
Up to 100 increments per revolution.
A tactile detent mechanism enables particularly sensitive operation.

**Practical LED lighting can be used
to illuminate the workspace.**

**Web visualization enables customized
programming of the user interface.**

tion for safety wiring on the gateway module. And, as a side note, the COP HT50 controller is an ARM Cortex-M Series processor, which stands out as a high-performance and highly energy-efficient component.

Developed for harsh working environments

With the new COP HT50 handheld operator, Schleicher Electronic has successfully combined the trend towards high-tech touchscreen controls with more traditional operating elements, such as buttons and a handwheel.

However, what are the real advantages of this "hybrid" solution and how much attention was given to customers' ideas during the development

Peter Brinkmann

Our current solution can be used to control the entire machine!"

of the COP HT50? In relation to these questions, Peter Brinkmann emphasizes increasing customer requirements: "With the growing complexity of equipment, our customers are increasingly seeing the need to replace the previous mobile handwheel solution with an intelligent touchscreen device. Our current solution can be used to control the entire machine!"

Tangible benefits

But this is only one customer-related aspect that went into developing the handheld operator from Schleicher Electronic: "The idea for the integrated flashlight came directly from technicians who work with machines on a daily basis. The gateway connection to the central Ethernet realtime network also enables automation with a single central machine network," explains Peter Brinkmann, going on to point out an additional concrete advantage of the COP HT50 unit: "Reducing the number of interfaces facilitates installation and boosts availability. The gateway also makes it possible to disconnect the unit from the power supply while the machine is switched on. This is a particularly attractive feature for machine setters whose work involves frequent switching between machines." ■

Source: Konstruktion & Entwicklung

Encoder Profile for the sercos® III Automation Bus

Traditionally, for machines using sercos as a drive bus, the measuring system was connected to the servo drive or directly to the control – but not via the sercos real-time bus. The universal use of sercos results in the requirement to integrate measuring systems directly into the sercos network.

Profile structure of sercos III devices
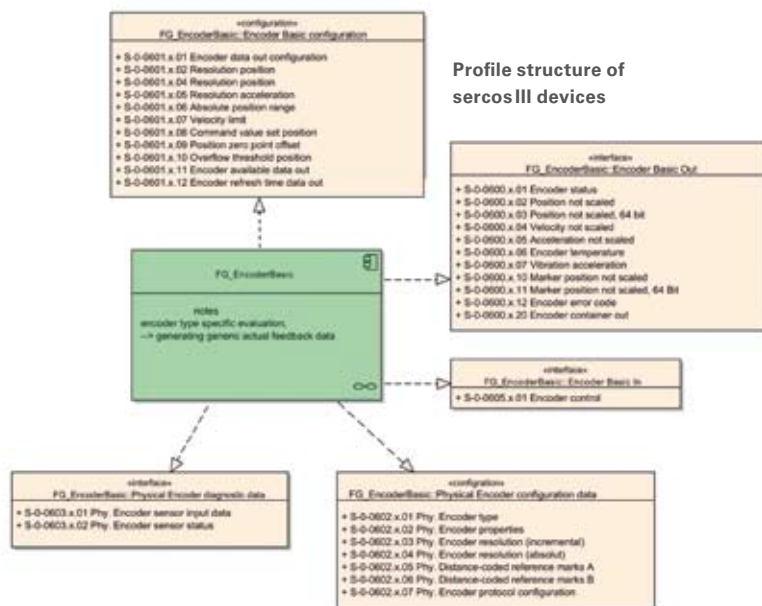
the cyclically transmitted telegrams. Runtimes in the network are compensated so that a synchronization accuracy and simultaneity of well below 1 µs is reached in the sercos III network. Any additional Ethernet protocols can be transmitted in a configurable, separate time slot without affecting the real-time performance of the network. This channel is used to operate EtherNet/IP devices in a common network infrastructure, for example. Furthermore, the safety aspects: the „CIP Safety on sercos" concept is a protocol extension compatible with sercos III to enable the use of the technologies in safety applications up to SIL3 in accordance with IEC 61508, even with minimal cycle times.

sercos – fast and synchronous via a single cable

sercos is one of the world's leading serial interfaces for communication between controls, drives and decentral peripheral devices and has been used, for example, in machine engineering for over 20 years. sercos III provides an Ethernet-based automation bus that supports a speed of 100 Mbit/s at full duplex and allows for the use of copper and fiber optics cables. sercos III real-time telegrams are transmitted as collective telegrams in a broadcasting procedure and processed by all connected devices during a cycle. The cycle times are set from 31.25 µs to 65 ms and can be adjusted according to the application requirements. The sercos transmission method allows for the exchange of real-time data between any devices within one communication cycle. The data is transmitted via direct cross communication) as quickly as possible and is also available synchronously, i.e. in an identical cycle. The synchronization procedure used by sercos is derived directly from

Uniform profiles for interoperability

However, standardization must unify not only communication (physics and protocol), but also the functions of the different types of automation devices so that devices from various manufacturers can be combined in the network without much engineering effort. For this reason, various profiles were specified by the sercos user organization. The communication functions are determined in the sercos communication profile (SCP). General device functions are summarized in a basic profile, the generic device profile (GDP). The device-specific functions are unified via function-specific profiles (FSP). The FSP drive defines the commands and parameters for electrical servo drives, frequency converters, as well as hydraulic drives. The FSP I/O defines the functionality for compact and modular I/O assemblies. The underlying device module was designed so that, in addition to pure devices, hybrid devices that combine various applications in one device can be realized.
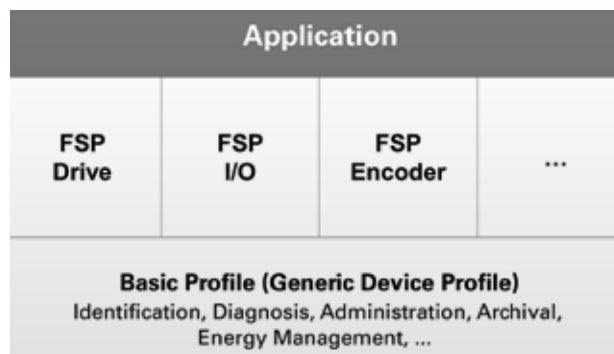
The encoder profile for sercos III

The FSP encoder profile recently developed by a working group at sercos international ensures that encoder functions are available via clearly defined interfaces, uniformly and network-wide, regardless of the manufacturer. Already specified parameters for motion control encoders that were a component of the sercos drive profile were considered while determining the profile. The requirements of various encoder manufacturers were also integrated, especially with regard to their experience with existing, comparable device profiles of other bus systems. The encoder profile defines which encoder functions are supported and how these functions can be used by other devices, e.g. controls. The interoperability of devices from different manufactures is ensured thanks to the scaling of the position information defined in the profile. Users can select the encoder best suited for the respective application without having to fear compatibility problems. The encoder profile can be used in diverse applications. In addition to a stand-alone encoder, the profile can also be instantiated multiple times and combined with other function profiles in a hybrid device (e.g. servo regulators with two connected encoders).

Thanks to the sercos III transmission method (producer-consumer principle in combination with direct cross communication), the data provided by an encoder („producer") can be processed directly by one or multiple connected sercos III devices („consumer"). Moreover, it does not matter whether the consumer is a master or a slave.

sercos III encoder profile interfaces
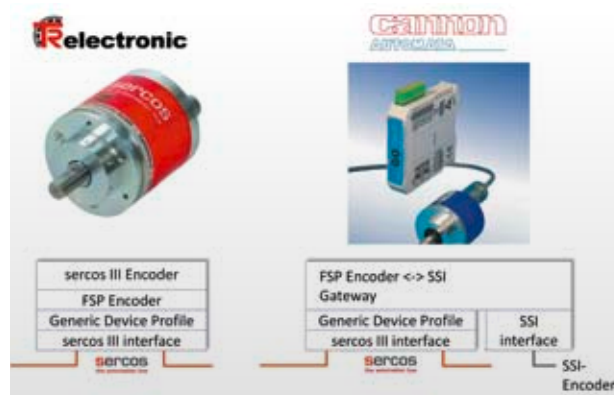
First implementations of the sercos III encoder profile

Implementing encoder solutions based on sercos III

Various types of hardware solutions are available for the implementation of a sercos III encoder. ASIC and processor solutions are supported in addition to FPGA modules of renowned manufacturers (such as Altera, Lattice, Xilinx). Some examples are the Hilscher netX family and Sitara AMA 335 x microprocessors by Texas Instruments. Frequently, device manufacturers can adopt an already existing hardware design that was implemented for another Ethernet protocol. Only the software has to be adjusted in order to connect the encoder logic to the sercos III profile and the sercos III protocol. The first implementations of the encoder profile were introduced at the SPS/IPC/Drives in Nuremberg. TR Electronic showed an absolute encoder with integrated sercos III interface; CANNON-Automata presented an SSI gateway that can be used to integrate SSI encoders of any manufacturer into sercos III networks. ∎

The encoder profile specification is available to interested companies as a PDF file. Registration on the sercos international e. V. specification server is sufficient (see link below). For sercos members, a version of the specification can be found online in sercos Wiki. Initial training is simplified considerably thanks to search functions and links to relevant parts of other specifications. Furthermore, new specification drafts can be accessed.

Link: https://www.sercos.org/accredit

Packing Power for Several Main Drive Solutions

Schneider Electric has introduced a servo drive with 130 A peak current for main drives and other situations requiring high-performance servo motors. The LXM 62 DC130A fits seamlessly into the design of the Lexium LXM 62 multi-axis servo drive system in the PacDrive 3 automation solution.

The new servo drive enhances the performance range of LXM 62 multi-axis servo drives for the PacDrive automation system by adding a version for up to 50 A of continuous current. It can easily generate a peak output of up to 130 A for brief periods. This makes it suitable for the highest performing servo motors in the PacDrive SH3 series, and also compatible with torque motors or asynchronous motors at similar performance levels.

The LXM 62 DC130A now allows the use of PacDrive's servo-based, integrated solutions to create main drives for several machines used in packaging machinery, paper processing equipment, and other servo technology applications. Used in combination with asynchronous motors, these drives can be incorporated into the PacDrive 3 system's diagnostic mechanisms via integrated sercos® III communication. This approach also makes it possible to implement uniform drive technology in a single machine. ■

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FP160 Multi-Channel Temperature Controller

The FP160 temperature controller is a 16-series product. A single processor can be used to set up 8 or 16 zones for 2-point or 3-point control. The default interface RS485 with FE3 protocol enables a direct connection to operator panels or higher-level systems. Users can also select an optional extension featuring an Ethernet interface compatible with sercos® III and other protocols. ■

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Eckelmann AG
Presents E°EXC 88
Controller

ECKELMANN The company presented its E°EXC 88 controller as a special highlight at SPS/IPC/Drives 2012 in Nuremberg, Germany. The new controller generation for PLC, motion, and CNC applications stands out with its compact dimensions, low energy consumption, and the large instruction set in its CNC core.

Eckelmann CNC controllers have always featured a wide variety of technology-specific functions, which provide optimal support for diverse tasks ranging from cylindrical grinding to flame cutting. The CNC core is the focus of ongoing enhancement strategies. Customer-specific adaptations also enable use in virtually any application situation. Motion functions designed according to PLCopen standards are seamlessly integrated with CNC functions; all axes can be used as either CNC or motion axes. ■

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New Connectors from
Escha Bauelemente GmbH

ESCHA As a connectivity specialist, ESCHA provides a fine-tuned portfolio of wiring components for sercos®. The company offers a number of built-in connectors for device integration, and a versatile portfolio of plastic-molded access lines and connection cables for network configuration, in addition to user-configurable plug-in connectors. The 4-pin d-coded M12 connector range contains both straight and angled versions. Available built-in connectors include stranded wire, cable, and print variants. A UL-certified PUR halogen-free cable suitable for use with drag chains is also offered as a simple cable variant in a 100 m coil. ■

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Compact System CS351 from
Bosch Rexroth

Rexroth
Bosch Group

The sercos®-capable compact single-channel controller for Rexroth electric nutrunners (with torque and angle-of-turn control) enables fast, secure, and easy commissioning. Thanks to the large TFT display, users can view the results at any time. ■

CIP Safety on sercos®:
Integrated Data Safety Technology for Complex Applications

Bihl+Wiedemann

Bihl+Wiedemann has expanded its product portfolio to include the AS-i 3.0 sercos gateway with integrated safety monitor for CIP Safety on sercos. The gateway is ideal for complex applications, e.g. for systems with widely distributed networks containing various safety circuits and many secure signals, or applications where numerous standard signals need to be integrated in the security configuration.

This new sercos gateway can be used to transmit data from safety input slaves and safely control safety output slaves via CIP Safety. Six safe outputs are already integrated in the device. Moreover, safe AS-i outputs are supported in both AS-i circuits, and several safe outputs are possible with a single AS-i address. The new CIP Safety gateway from Bihl+Wiedemann features an AS-i 3.0 double master for two AS-i circuits and is equipped with advanced diagnostic functions such as duplicate address detection, integrated ground fault monitoring and EMC detection, as well as an Ethernet diagnostics interface. The built-in chip card permits easy storage and transmission of the configuration data. The gateway is available in the version "1 gateway, 1 power supply for 2 AS-i circuits". ■

CANNON-Automata –
sercos® III Gateway for any SSI-Encoder

SSI is the standard interface for absolute encoders. With the SSI-Gateway, CANNON-Automata introduces a simple and inexpensive device that allows the connection of SSI encoders from any vendor to a sercos III network. The SSI-Gateway supports up to four sercos real-time data connections. Thus, it is possible to make the acquired position available to any other device connected to the sercos network – an important feature for applications with master and slave axes, cam profiles, or electronic gears. In addition to the position value, the device can also measure and transmit the actual velocity and acceleration. The device supports a wide range of SSI protocol settings and is suitable for the connection of practically all SSI encoders available on the market ▪

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sercos® MultiSlave Emulator

Furthermore, the actual machine configurations at the customer's facility can be reproduced in an in-house laboratory, in order to execute error detection and diagnosis – with a minimum of hardware effort.

The sercos MultiSlave Emulator was developed at the Institute for Control Engineering of Machine Tools and Manufacturing Units (ISW) in Stuttgart / Germany and can be purchased via sercos international e. V. ▪

The sercos MultiSlave Emulator is an extremely versatile, PC-based development tool for the machinery industry, control manufacturers and system integrators. It facilitates the emulation of a sercos network with multiple slave devices for development and testing of various network configurations.

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sercos® III Slave Development Board

EBVElektronik
I An Avnet Company I

The DBC4CE55 (MercuryCode) is an Altera® Cyclone® IV development board with several I / O transceivers for industrial communication purposes. ■

New Machine Control Options Thanks to 3D Vision

opdi-tex Complex machines and systems require numerous sensors to detect the orientation and position of system parts and / or products.

This is where the "opdi-SK2 kompakt" camera – the stereo-smart camera with integrated Ethernet and sercos® interface – comes into play. It offers numerous options for production and tool monitoring. It may be used as a:

- Stereo camera
- Stereo camera with synchronized pattern beamer, or
- Multiple photoelectric switch, replacing up to 30 photocells at once

Unlike common reflex switches, this camera is also able to detect and track the distance to an object or marker.

Southern China's Largest Trade Fair Registers over 25,000 Visitors

With approximately 500 exhibitors from 15 countries, SIAF (SPS – Industrial Automation Fair) in Guangzhou, China, is the largest and most important trade show in Southern China, a region often referred to as the "world's factory". The event has developed into a key trade show for industrial automation in Asia in recent years. sercos international e.V. was represented at this year's SIAF with a joint booth that featured innovative products and solutions for sercos® the automation bus. Numerous visitors took advantage of the opportunity to attend a conference and learn more about the latest developments and trends in the world of sercos. ■

9th MC4 Motion Control Continues Successful Tradition of Previous years

50 international exhibitors met in Bologna, Italy, at the industry's largest gathering on March 5, 2013. They presented innovations, groundbreaking trends, and new products from the world of Motion Control technology. More than 20 presentations at the accompanying conference confirmed the outstanding position of MC4 Motion Control as the industry's leading conference. The annual event provides a platform to discuss a variety of topics relevant to the automation community.

sercos international e.V. attended the event in collaboration with Automata S.p.A. and Bosch Rexroth. The member association confirmed the overall success of the conference, also thanks to the presentation by Marco Fantoni, Sales & Marketing Manager of Automata S.p.A. In his talk focusing on the sercos® Energy profile, Fantoni pointed out: "Most automation products only concentrate on reducing energy consumption by improving technology. The sercos Energy Profile is a new concept. Based on the sercos III real-time communication system, the sercos Energy Profile makes the components' energy consumption transparent, enabling full control over loads. This intelligent new approach is a true innovation." ■

sercos international Sets
Record for Visitors and Exhibitors at
SPS/IPC/Drives Exhibition
in Nuremberg, Germany

More than 20 companies from a wide range of areas presented exhibits and product demonstrations at the user organization's joint booth, which attracted 40% more visitors than in the previous year. This growth also reflects the numbers in the „World Market for Industrial Ethernet" report, published by IMS in April 2012. This study predicts that sercos® III will achieve the second largest growth rate for newly installed industrial Ethernet nodes by 2015.

The first demonstration systems to showcase the use of a blended infrastructure for sercos III and EtherNet/IP devices were the main attraction at the booth. The devices were connected with controller prototypes from Bosch Rexroth and Schneider Electric, using a common Ethernet infrastructure via a single cable. ■

11th PlugFest from
May 15 – 16, 2013, in
Stuttgart, Germany

The 11th PlugFest for sercos® III will be held at the Institute for Control Engineering of Machine Tools and Manufacturing Units (ISW) at the University of Stuttgart.

During this two-day event, experts will subject a number of new products with various configurations to intensive tests in combination with other communication participants. Developers and other interested professionals are welcome to attend. Simply send us an e-mail to register for this free event: info@sercos.de ■

SPS/IPC/Drives 2013
in Parma, Italy

The SPS/IPC/Drives 2012, hosted in Italy, was a complete success, registering significant increases in visitors and exhibitors.

sercos international e.V. will also be represented at this year's event with selected member companies. Come join us in **hall 2, booth E66**, and find out more about our latest products and technologies. ■

May 2013

sercos® Technology forum:

5/14/2013, Stuttgart

The sercos® Technology Forum

Technical experts, such as developers, product managers, and technical sales staff, are warmly invited to join us at this **free** one-day seminar. The event will take place on May 14, 2013, at the Institute for Control Engineering of Machine Tools and Manufacturing Units (ISW) in Stuttgart, Germany, and will cover both conceptual and field-related topics in the automation industry.

Would you like to join us? Simply send us an e-mail to register: info@sercos.de

Register now!

S Technology Forum Agenda

sercos Technology Forum – Theory and Practice

9:00 – 9:30 a.m.
Check-in

9:30 – 9:50 a.m.
Welcome

9:55 – 10:40 a.m.
CIP Safety on sercos –
Theory and Practice

10:45 – 11:20 a.m.
Cutting Costs with
sercos Energy

11:25 – 11:45 a.m.
sercos® III and EtherNet/IP
on one Single Cable

11:50 – 12:30 p.m.
Vision & Motion –
sercos® III Connects Worlds

12:30 – 1:45 p.m.
Lunch

1:45 – 2:15 p.m.
Efficient Diagnosis
Minimizes Downtimes

2:20 – 2:50 p.m.
Easy Device Integration
with Industry Standards

2:55 – 3:30 p.m.
Tips & Tricks