Issue 01/2011

sercos news

the automation bus magazine

sercos
A Future-proof Standard

The sercos guitarist
No Stage Fright on Opening Night

One Cable is all you need
Industrial Ethernet with sercos

Evolutionary Progress

Without language, there would be no civilization. The advent of speech was an evolutionary leap for humanity. It allowed humans to bundle their strengths by the division of labor and pass their knowledge on from generation to generation. History has left little doubt: a common language is the driving force behind human progress.

This also applies when machines communicate. Uniform standards are required to avoid a potential Babylon among machines. As an universal and open automation bus, sercos takes on this challenge – with increasing success. sercos has taken automated communication to a whole new level with its transition to a uniform bus system for diverse requirements. This achievement will now be made visible to the world: with a new brand appearance. We have also completely reworked sercos news and added a new, modern look.

Please enjoy this new edition of sercos news. I look forward to your feedback.

Dr. Bernd-Josef Schäfer

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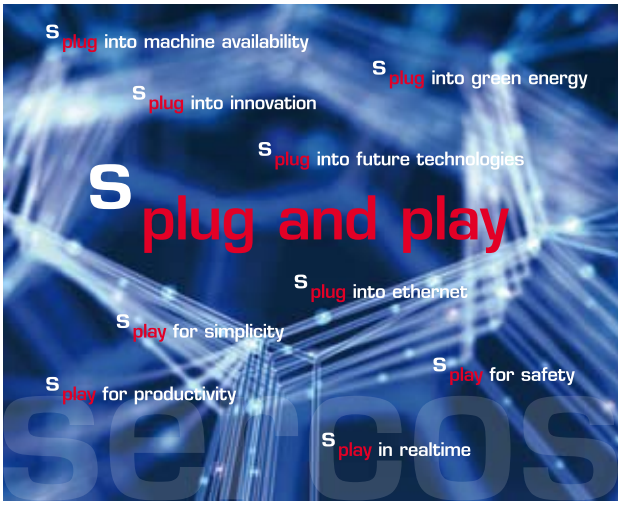
Technical and Esthetic Evolution

New look for sercos

sercos has a new company appearance. "The visual changes emphasize the evolution of sercos technology," explains Peter Lutz, Managing Director of sercos international. The new logo will have a red "s" as an integrated image element. The typography and the red and gray color theme reinforce the modern technical appearance. The logo will be accompanied by a new claim: "sercos – the automation bus". This emphasizes the company's significant transition from a drive bus to a universal automation bus. Previously, there was a tendency to use several bus systems to cover different data communication needs in machine and systems engineering. In its latest evolution stage sercos provides an uniform bus for a wide variety



of automation devices, offering safety, I/O communication and additional Ethernet protocols, in addition to drive communication. This reduces the number of interfaces, required in a system, enabling standardized engineering and scalable functions. The new design made its first appearance at the Hannover Tradeshow 2011 and will be gradually phased in to all communication media. ■

sercos
the automation bus

sercos Intensifies Cooperation with ODVA

ODVA™
Networks Built on a Common Industrial Protocol

CIP Safety and more: enabling added synergies for users

sercos is poised to expand its cooperation with ODVA. This announcement was made by both organizations at the Hannover Messe 2011. This will enable additional synergies for user companies, for example with regard to optimized control networking and improved continuity. Both sercos and ODVA promote open, uniform standards for the automation industry. The companies have been collaborators since 2006. As part of this cooperation, sercos uses the CIP Safety protocol from ODVA for secure communication in accordance with IEC 61508. Machines equipped with this protocol can communicate via sercos and use the CIP Safety channel for security-relevant functions in applications up to safety integrity level 3 (SIL3). If an operator intervenes in the machine, commands – such as a safe deceleration or a complete emergency shutdown – are reliably transmitted to all system components. The protocol ensures that the required data packets are sent correctly and completely. Because ODVA and sercos international provide conformity checks and corresponding certificates for the proper implementation of CIP Safety and sercos, it is possible to accelerate TÜV (Technical Inspection Association) approvals. sercos uses CIP Safety in its original format. This eliminates compatibility problems if a component not only needs to communicate securely via sercos, but other networks as well. ■

No Stage Fright on Opening Night

let the music play with sercos

A guitar-playing machine? What sounds impossible is already a reality. During the Hannover Messe, an electronic guitarist celebrated its debut at the sercos booth. sercos – the automation bus for a variety of applications – coordinates all components with a virtuosity that brings music to one's ears. sercos news had an exclusive talk with the guitarist.

sercos news: *Mr. Guitarist, for many, you are the new star on the music scene. Would you describe yourself as a full-blooded musician?*

Guitarist: A machine that plays an instrument is a rarity. However, there are electrons, and not blood cells, flowing through my circuits. Perhaps full-blooded musician is not the most apt term.

sercos news: *Your musical progress has been breathtaking. A little less than a year ago, you first started learning guitar and now you have your own show at the Hannover Messe. How did you do it?*

Guitarist: I delegated my own development to mechatronics students at the University of Stuttgart. They designed and implemented my functions as part of a project led by graduate engineer Jan Schlechtendahl. In the process, they were able to use everything they had learned in their studies, from machine programming to engineering design.

sercos news: *Experts are praising your sophisticated technology. What is your secret?*

Guitarist: I use an MLP industrial control from Bosch Rexroth and bus terminals from Phoenix Contact to actuate my lifting solenoids. Six to pluck the strings and 24 to operate the finger board. But the real secret to my success is the sercos automation bus. It keeps all my parts running smoothly.

sercos news: *Your repertoire is virtually never-ending. How often do you need to practice to stay in form?*

Guitarist: I am not familiar with "practice". And I cannot read notes. I did, however, learn how to interpret MIDI files. That's why I don't need a rehearsal space. The pieces just need to be loaded into my control and I can already command the stage.

sercos news: Do you get stage fright?

Guitarist: One of the many advantages of being a machine is that I don't get stage fright, unlike my developers. But you are right: It will be a special moment for all of us. I will perform five to ten pieces from my repertoire and put on a good show for the audience.

sercos news: This appearance in Hanover was only the first stop of what will reportedly become a world tour. Can you give us some more details?

Guitarist: We will be appearing at trade shows around the world and are already looking forward to meeting our fans.

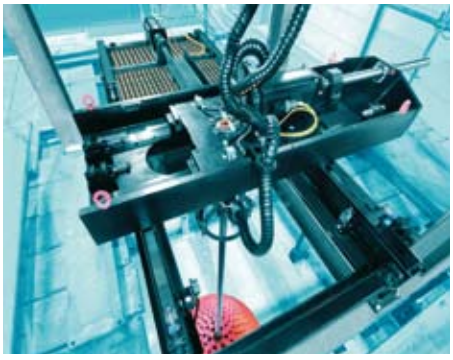
sercos news: *We?*

Guitarist: Oops, I've let the cat out of the bag. But now that it's out: My developers are currently working on an electronic keyboarder who will be accompanying me in the near future. And then we will be able to start our career as a real band.

sercos news: *Mr. Guitarist, I wish you all the best on your tour and thank you for talking to us.* ■

Shanghai, China: Visitors get German Technology Swinging

▲ High-tech pendulum driven by sercos drives
◀ X-Y cross slide consisting of roller rail systems with integrated measuring system and ball screw drives



Claps, shouts and screams – 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. The drive solution of the high-tech pendulum relies on proven drive and linear motion technology that has been designed for more than one million cycles – enough for the more than 10,000 shows during the world exposition.

The German pavilion has adopted the EXPO motto "Better City, Better Life" and has presented its interpretation as "balancity" – a city in balance between renewal and preservation, innovation and tradition, urbanism Application and nature.

The crowning experience at the end of the circuit through the pavilion is the "Energy Source" with the interactive pendulum. From their positions on three galleries, the visitors can initiate and steer the oscillations of the 1.2 ton interactive sphere by making noises, until the sphere ultimately swings along a perfectly circular path. This is enabled by an X-Y cross slide mounted under the roof, which moves the pendulum shaft via a cardan (universal coupling) joint. The slide consists of four roller rail systems measuring just under 1,800 mm long, each with two long size 65 runner blocks. They give the system its extremely high rigidity and ensure the long life required for travel at sometimes extremely short strokes. One of the guide rails in each axis features an integrated inductive measuring system for the ball and roller rail systems. The guide and the measuring system act as a single unit. A sensor on the runner block inductively measures the relative position in resolutions of up to 0.25 µm. Two servo drives position the two axes with high dynamics via ball screws and communicate in strict real time with the PC control system via sercos. The modular drive generation has many drive-integrated safety functions already certified per ISO 13849. ■

sercos – A Future-proof Standard: Broader, Deeper, more Universal

New functions in the application layer for a variety of types of devices, and an ever larger availability of controllers; electrical, hydraulic and pneumatic actuators; and numerous peripheral devices expand the range of sercos applications into a universal network for automation technology. This makes the internationally accepted standard for Ethernet-based real-time communication easier to use in complex applications such as semiconductor manufacturing and in entire production lines in the food and packaging industries.

The future has a past. Over twenty years ago, drive and control manufacturers developed sercos as a means to advance the benefits of decentralized automation structures through internationally standardized real-time communication. What nobody dared to hope for back then is that 20 years later, sercos, the worldwide recognized standard, still uses the same hard real-time mechanisms that have since proven themselves in several million nodes. This goes to show that non-proprietary systems are more stable and long-lived than proprietary systems. The state of the art for demanding real-time communication has been characterized by only three technology generations in two decades. In the third generation the proven real-time mechanisms are combined with the Ethernet physical layer, thereby opening up additional areas of application. At the same time, sercos has been changing from the original controller-drive communication into a universal bus for decentralized and centralized automation concepts.

Broad spectrum of industrial automation applications

While in the early stages the focus was mainly on the requirements of machine tools, newspaper printing presses were starting to take advantage of sercos' high synchronization performance as early as the mid 1990s. The electronic line shaft revolutionized web-fed printing press engineering by enabling the switch to a much more flexible and productive technology using individual drives. Likewise, numerous manufacturers of machines for the food and beverage industry and packaging machines were quick to recognize the advantages of real-time communication and replaced mechanical solutions by softwarecon-

Semiconductor applications: Time-stamping opens up new communication options beyond the fixed clock cycle and allows the evaluation of a variety of process parameters

trolled drives communicating via sercos. Software functions such as electronic cam switches, cams, print mark and tension controllers increase flexibility in automation technology and significantly reduce changeover times. Currently, engineers developing robots, semiconductor manufacturing machines, and complex special applications are working on new concepts with sercos as the universal bus of choice. Aside from the technology's proven long life-cycle and the resulting return on investment – with over 60 companies around the globe supporting sercos with controllers, drives using a variety of technologies, and peripheral devices – new functionalities and an expanded range of drives allow for a greater degree of freedom for innovative concepts.

Transparent data access to all drive technologies

Following the lead of electronic drives, hydraulics and pneumatics are also turning more and more towards digitally controlled modules. This increases flexibility and shifts tasks previously solved by mechanical means to software solutions. sercos translates these advances into consistent automation structures. Thus, hydraulic and pneumatic drives using sercos interfaces are unifying communication across different technologies.

New functions in the application layer

At the same time, sercos developers are working on increasing process stability and precision through new functions in the application layer. They are also focusing on new applications in robotics and semiconductor manufacturing. Two areas of concentration are transmitting more information per clock cycle and transmitting event-controlled information independently from the fixed clock cycle. The new oversampling function in sercos makes it possible for the first time to transmit more than one target/actual value per clock cycle.

This increases the process control intricacy in extremely time-critical laser applications for instance, because it allows for more data to be collected and communicated at a faster speed. Measurement methods are integrated directly into the protocol, thereby opening up the possibility to access these mechanisms across different manufacturer's equipment and independently of the product. Likewise, time-stamping opens up new communication options beyond the fixed clock cycle. This function is event-controlled, promptly transmitting defined events such as certain measurement values to the controller and switching outputs independently from the clock cycle. This increases process stability in complex solutions such

Flexibility is the key. sercos is already well established in the food and packaging industries

as those in semiconductor manufacturing for instance, where controllers tailored specifically to the semiconductor and solar industry process the signals from up to 120 digital and analog I/Os in realtime. Unlike most other industrial production processes, the production of semiconductors requires numerous process steps to be carried out in a vacuum or under inert gas. Automation solutions must therefore simultaneously record, evaluate and react to numerous sensor signals. Oversampling and time-stamping are important additional functions that increase process stability.

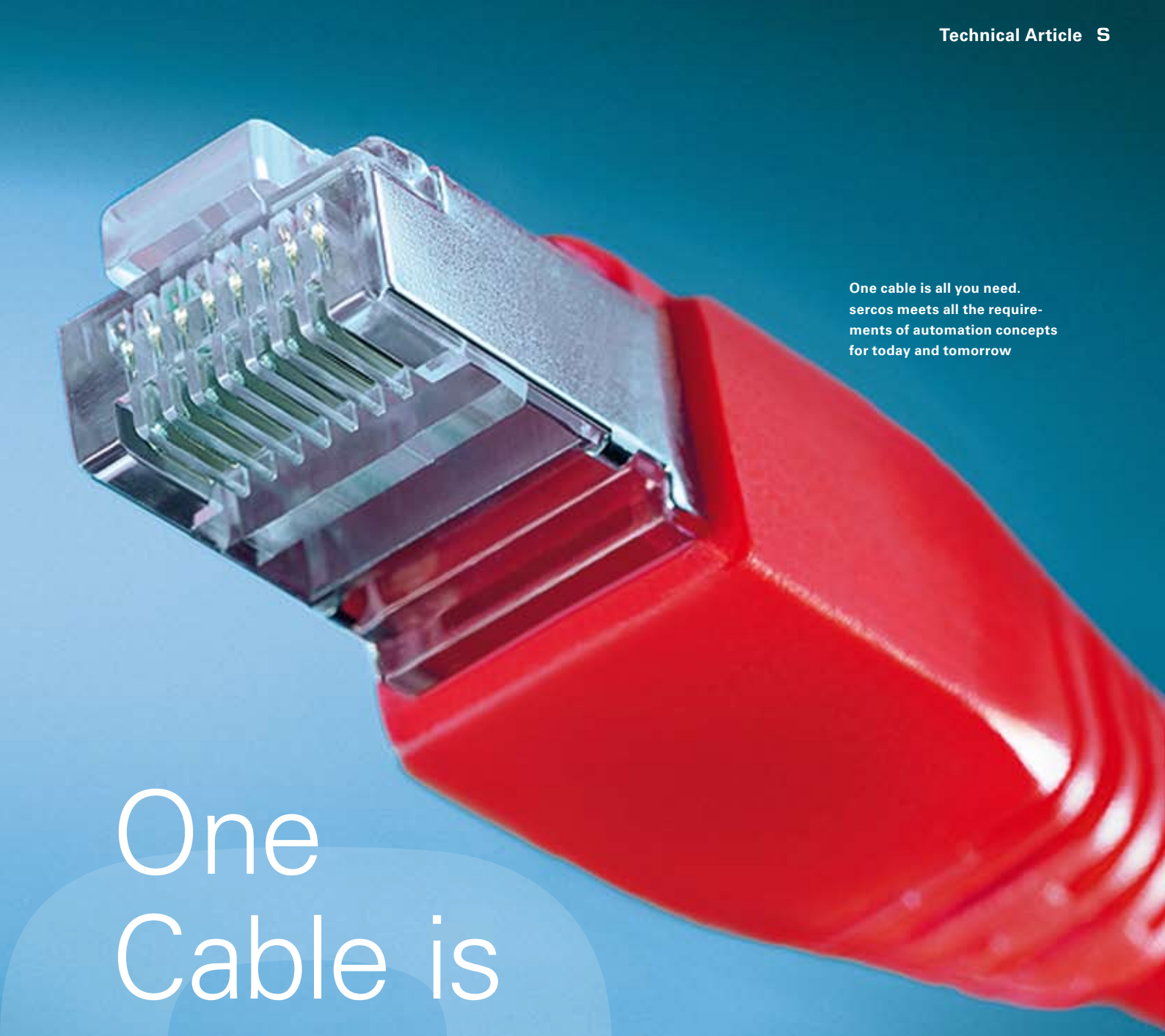
Straightforward engineering

In addition, sercos simplifies the entire engineering process by offering a harmonized and consistent semantic both for devices with a modular physical structure such as modular IOs, and devices with a non-modular physical structure, such as drives. This functionally oriented device classification harmonizes engineering and diagnosis within industrial automation. It lets users and programmers simulate the automation offline prior to going live, which in turn shortens time to market. One special feature of sercos is real-time cross-communication between controllers. This drives modularization in mechanical and plant engineering. The controllers of various modules and machines simply have to be connected through sercos via an Ethernet cable in order to synchronize and exchange information with each other in real-time.

This even more intricate flow of information due to oversampling, time-stamping, and real-time cross communication between controllers points the way to the future. The broad support by many independent manufacturers continues to expand the technical performance and universal applicability of sercos on an ongoing basis. As a result, there will be further growth into new applications as the sercos organization enters its third decade. ■

S More Informations

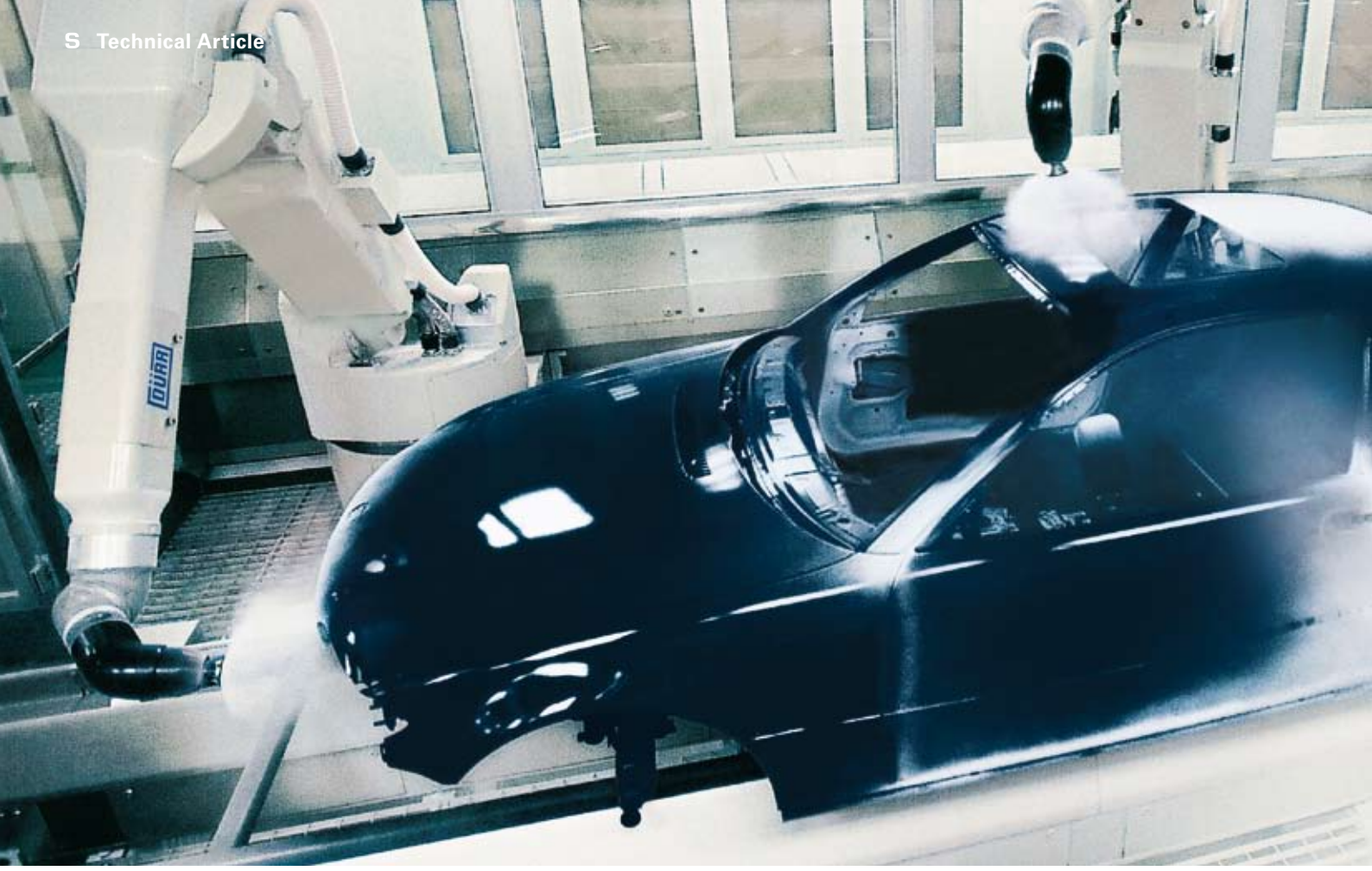
www.sercos.org



One cable is all you need. sercos meets all the requirements of automation concepts for today and tomorrow

One Cable is all you need

Additional functions in the machine engineering process will no longer have to be bought as extra equipment. High-performance solutions allow you to use the data network for production tasks that have so far had to be done by separate hardware. This increases the economy of engineering and the efficiency of systems operation.



On the 6th of May 1840, the Royal Mail in England revolutionized the postal system. Until that time, it was the unquestioned norm to pay an individual charge for each letter or parcel based on how far it was to be sent, and you wouldn't know what that charge was until you asked. That made the postal service expensive, cumbersome and staff-intensive, and resulted in a chronically failing business.

In 1839, Sir Rowland Hill (1795–1879) made two important changes: First, he invented uniform postal rates for standard letters; and second, he introduced the first self-adhesive postage stamp, called the "One Penny Black", so that customers could stamp their own letters. The reform met with controversy, since traveling a long distance would naturally incur greater costs than would a simple delivery within London. What the critics failed to notice, however, was the enormous efficiency boost this unification brought with it. Given the affordable rates, more customers started using the postal services; the staff no longer had to calculate the cost of each letter separately; the uniform pricing system created new services, and the Royal Mail was being worked to fuller capacity than ever. The failing business promptly grew into a booming enterprise, the revolutionary methods of which we still use worldwide today.

The moral of the penny stamp is a typical lesson in the study of efficiency: consistent standardization and simple rules make systems easily adaptable and implementable without having to suffer any loss. And the more players adopt the basic rules and join in the game, the greater the benefit for all. The so-called network effect explains the rapid spread of the Internet as soon as this, originally academic, network was opened to the public.

The Internet protocol has found its way into production in the form of Industrial Ethernet. It uses the same protocol – TCP/IP – but addresses the special nature of a raw factory environment. Anyone who wishes to have precise control, to within a fraction of a millimeter, over an array of axes must not be influenced by dust, vibrations or electric fields. Another capability indispensable in machine engineering is a guaranteed realtime connection with short cycle times, whereas no office will suffer if an e-mail arrives a few milliseconds late.

Industrial Ethernet allows a uniform infrastructure for communication across all levels of the automation pyramid. Vertical integration from sensors to bookkeeping software opens up new possibilities in operations management. At the same time, modern networks allow greater flexibil-

Standardized interfaces ensure that all components work together and ensure high rates of first-run with minimal power consumption

ity in the structuring and expansion of controller topologies along the production chain than do conventional field busses. "Bosch Rexroth solutions are characterized by a high degree of economy and efficiency. sercos helps to achieve this essential added value," states Karl-Friedrich Rauterberg, Head of Automation System Development at Bosch Rexroth. "sercos' flexible design makes it possible to use the same data in a machine, system, or production chain without system interruption. Even worldwide networking for maintenance and diagnostic purposes is possible using sercos," adds Rauterberg.

Unlike field busses, real-time Ethernet solutions such as sercos also allow safety-related data relay over the same network. A certified safety protocol eliminates the need for extra hardware, since system-critical messages such as pushing the emergency stop button are guaranteed to go through. Just as a single postal rate was all it took for England, all it takes for sercos is a single cable to cover all of the communication needs of machine engineering efficiently and economically.

This is possible because sercos unifies all critical aspects into one standard, and does not recognize different terminology characteristics for different applications. The basis for this is the high reliability and performance of the mature real-time Ethernet solution. sercos unifies fast data transfer of 100 Mbits per second with an extremely short cycle time of 31.25 microseconds. Alongside realtime (RT) data, non-real-time (NRT) data can be simultaneously sent over the same network, even though both methods use the Ethernet protocol transparently. In a sercos III network, a service technician could therefore connect a notebook to a sercos node using a conventional Ethernet cable, for example, and use the network without proprietary hardware or software.

The same consistency applies to the transfer of safety-related data. If a sensor detects overheating or a blocked transport path, then the information must be relayed with absolute reliability to the controller so that the program can initiate the predefined measures. A certified safety protocol guarantees reliable data transfer.

sercos safety is based on the CIP Safety protocol of ODVA (Open DeviceNet Vendor Association). It is supported by various communications standards such as DeviceNet, ControlNet and Ethernet/IP, and allows users to use the same safety mechanisms on different platforms. CIP Safety on sercos fulfills the requirements of the safety standard IEC 61508 at up to Safety Integrity Level 3 (SIL 3). This means it covers risks that, in the event of a system failure, could endanger workers or the environment. In mechanical engineering, safety data is traditionally relayed over separate lines. sercos uses existing data lines, since it has integrated measures against faults such as cable rupture or data transfer errors. Eliminating the need for additional hardware reduces costs without sacrificing safety.

An affordable, integrated communication chip gives every sercos device all the intelligence needed for a largely selforganizing network. It allows cross communication between controllers and between drives, for example. The autonomous nodes make the communication network independent of central controllers, giving engineers greater flexibility in their designs. It also eliminates the need for expensive control units such as hubs and switches in the network setup. That also reduces system costs, making it an attractive option for users to employ sercos as a single system for all communication tasks.

"As a universal automation bus, sercos stands for efficiency in machine production and system implementation," states Karl-Friedrich Rauterberg. "Machine operators and

developers profit twice from sercos: First of all, sercos already includes the functions we need, so we do not need any costly add-ons from other providers. Second, sercos enables implementation of a reliable and fast communication infrastructure with little effort and without any great investment."

The high degree of standardization makes the transition from the world of field bus to sercos extremely easy. The sercos drive profile has been defined in IEC standard 61491 since 1995. With Industrial Ethernet, IEC 61800-7 (drive profile) has become more important. Again, the proven drive profile on which all three sercos generations are based is laid down in this standard.

sercos international, a neutral association of users and manufacturers, oversees the technical development and certification of the sercos family. This guarantees the highest possible degree of compatibility. By adding more device profiles (e. g. for local sensors), solutions from different vendors can be integrated without necessitating enormous development costs. The reduction of the system interfaces and the degree of standardization are other ways that sercos keeps the costs of engineering down.

With sercos, one solution covers the entire communication requirements in production, be it vertical integration with the office systems or synchronous controlling of multiple-axis systems, the data transfer between local controllers or guaranteed relay of safety-related information. sercos accomplishes all tasks with a single standard and over a single cable. This sustains the efficiency that is demanded for the economical development of modern machines and systems. After all, companies do not need to train their workers in different network technologies, but can build up a common pool of knowledge for their future benefit instead. Logistically, only one standard type of cable needs to be stocked, which keeps down the price of spare parts storage and supply.

170 years ago, Sir Rowland Hill set an example that a uniform and simple system increases profitability. The advantages of a common standard outweigh all doubts and questions of detail. Thanks to standardized interfaces ensure that all components work together and ensure high rates of first-run with minimal power consumption. to sercos, those who wish to develop engineering solutions economically and simply can limit themselves to a single solution and a single cable for all applications without any loss in flexibility and safety. ■

sercos relieves processes and reduces the effort and costs

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sercos energy – The Energy Profile for sercos

sercos energy allows the machine controls to switch connected components into energy- saving conditions, up to complete shutdown, in a targeted manner, considerably reducing their energy consumption. For this purpose, sercos energy makes the components' energy consumption transparent allowing for an intelligent control of loads.

The climate discussion has raised the public awareness of the energy efficiency topic. Within the scope of this increased attention, more and more products are being promoted with reference to their energy efficiency. In this connection, the green image is in the foreground but energy costs play an important role as well. However, most current automation products focus mainly on the reduction of energy consumption through the permanent improvement of process chains, procedures and machine efficiencies via structural measures. Because machines and systems are operated under continuously changing requirements and boundary conditions, such "average optimization" only opens up a part of the energy efficiency potential. Thus, measures for energy-optimal operation and control of machines and systems are required for overall energy efficiency. These measures must optimize the energy consumption of machines and systems depending on the process and external influences as well as depending on the operational situation.

sercos energy is an application layer profile for sercos devices that defines parameters for the reduction of energy consumption in a uniform and vendor-independent manner. The control reads out standard parameters of each sercos energy component via the sercos network, receiving status information and detailed consumption values. Depending on the situation (e.g., scheduled or unscheduled breaks, machine components not needed in the current production process) the control can switch connected components (drives, I/O, sensors) into energy-saving conditions, up to complete shutdown, in a targeted manner, considerably reducing their energy consumption. sercos energy provides suitable measures for an energy-optimal operation and control.

The profile considers energy-saving conditions for predictable breaks such as lunch breaks and plant holidays. At predefined times, sercos energy components are brought into a standstill condition in order to save energy. Shortly before the end of the interruption, sercos energy provides for the reinitialization of the components into stand-by condition in order to make them available again with utmost precision. Apart from that, sercos energy provides mechanisms for unintended breaks that may be caused by machine errors and missing parts. System components can be brought into energy-saving conditions in a targeted manner while the errors are being remedied or during a wait for new parts.

Furthermore, sercos energy in combination with sercos offers the possibility of saving energy while still achieving full productivity. Using intelligent controls, axes and components that are not necessary in current production processes can be switched off and/or target completion times can be adjusted. Especially with flexible production, the energy saving that can be achieved via sercos energy is enormous. ■

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Manz laser and mechanical scribing systems

Manz Scribing Systems and sercos: Maximum Thin-film Module Efficiency

With an installation base of more than 100 machines, Manz Automation AG is a market leader in scribing systems for thin-film technology. In this technology, very thin layers are applied to a glass surface; two conductive layers as well as the absorber layer. This promises to be a leading in large scale photovoltaic modules. Manz scribing systems are available for various processes: not only mechanical (CI(G)S: P2, P3) but also laser-based (P1, P2 and P3) scribing operations can be performed with maximum precision on Manz systems.

Since efficiency of solar modules is key for a shortest return of investment, module manufacturers are strongly looking into process optimization. One approach for increased module efficiency is to minimize the dead area of solar modules. By using the Manz proprietary active tracking system IPCS (the Manz Inline Precision Control System), it is possible to achieve a dead area of < 200 µm. This unique feature was introduced to the market in 2009 and has been successfully sold to numerous customers. This is a milestone compared with other systems on the market, where the dead area is approximately 150 – 300 µm above this figure. The other advantages of Manz scribing systems can be seen in their low operating costs. Highest throughput and maximum efficiency are highly appreciated by our long-standing clients. In particular, exact parallel processing, which guarantees a reduction in cycle times with consistently high quality, makes a major contribution here. Inline monitoring, which is important for purposes of quality assurance, reduces non-productive times to a minimum. Besides the highly accurate processes and the high quality of the products, the well thought-out and flexible design of the systems is remarkable. It allows easy integration into fully automated production lines as well as the use of our tools for different scribing applications (i. e., scribing of a semi-transparent pattern on a TFsolar module (BIPV) and scribing of "standard pattern").

The next logical step for Manz was to establish a comparable solution for mechanical scribing tools. With the newly developed M-IPCS (active tracking for mechanical scribers) a 100% online control of the scribing process takes place. Each mechanical scribing tip has its own camera & control system which aligns the P2 or P3 scribe to its corresponding P1 (P2) scribe. This active mechanism

enables customers to minimize the dead area and compensate for substrate warp and distortion which might be induced by thermal treatment – during coating – of the glass substrates. This unique M-IPCS will immediately lead to an increased module efficiency of CI(G) S coated thin-film solar panels.

In 2010 the sercos II motion bus has been replaced by the sercos III system bus to achieve higher realtime bandwidth and optimum integration of machine control, IPCS and other field devices. Along with its outstanding realtime performance, sercos allows direct TCP/IP access with engineering and diagnostic tools from the desktop into the servo drives, IPCS and other field devices to achieve optimum service capabilities and minimum down times.

Due to the available bandwidth sercos provides the opportunity to integrate all fieldbus based devices on a single bus and is another contribution to clear system structure and reliability. sercos is ready for the fieldbus-independent CIP Safety protocol relevant for safe control of servo drive systems and laser sources. It will reduce total cost of ownership and additionally increase system reliability.

Manz scribing systems are characterized by:

- Highest throughput and efficiency:
  - more than double the throughput of most competitors due to number of tools in parallel and scribing speed
  - lowest non-productive times due to online alignment, loading and unloading in parallel, and ease of maintenance
  - accuracy/precision during scribing (alignment procedure; mechanical design of the stage; control)
- Most robust process due to active force adjustment of scribing needle
- Smallest dead area due to inline precision control (closed loop)
- Highest performance, serviceability and reliability due to sercos system bus

Manz scribing systems have been a pilot project for the sercos technology. Due to the positive experiences, the company is in progress to equip additional product lines using this technologically – leading Realtime-Ethernet fieldbus.

The main reasons to select sercos as a system bus can be summarized as:

- Maximum realtime performance, practically jitter-free
- Most consistent fieldbus specification to achieve optimum interoperability
- Independent standard, technology belongs to the standardization organization
- Maximum Ethernet conformity on every device due to built-in switch

Through additional activities Manz is motivating device manufacturers to invest into this future-safe fieldbus standard for highperformance production machines. ■

Heterogeneous sercos servo drive configuration

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Cimcorp TyrePick+ Makes Tire Manufacturing fit for Energy Efficiency

The tire industry is booming worldwide and manufacturers are building up new capacity in all the key markets. Finnish based company Cimcorp Oy developed its new TyrePick+ gantry specially for tire handling and placed its faith in the sercos open standard for the system. With a thirty percent boost in performance, it reduces energy consumption by forty percent.

Gantries are used in tire manufacturing for the task of stacking and transporting the blanks and finished tires. TyrePick+ from Cimcorp is the world's first plant of its kind that can feed the braking energy back into the DC link or supply system using Rexroth intelligent energy management.

Designed as a gantry axis, the bridge can cover a maximum length of 14 meters. In the Z-axis the bridge holds the gripper, which can pick up between one and ten tires, depending on their diameter. The X-axis traverses a length of up to 80 m. The bridge is made entirely of aluminum. This results in considerable weight savings compared to the previous version in steel, without any sacrifices in rigidity. Less mass translates into less energy required for the drives and better dynamics.

Not only were the mechanical elements redesigned, Cimcorp also brought the automation up to the latest standard together with system supplier Rexroth. For the communication protocol the Finnish-based company opted for sercos. Synchronization between the master drive of the drive-based IndraMotion MLD control system from Rexroth and the slave drives, of which there can be up to seven, and between several drive-based control systems, is realized in hard real time through sercos with a clock-pulse rate of up to 250 µs. The real time rapid cross communication, C2C, allows control networks to be set up quickly without the need for a higher level central control unit. This provides greater freedom for the modularization of machine concepts and makes integration in existing automation environments easier.

In terms of engineering, the commissioning engineer has access to the NRT channel of sercos at all times, irrespective of the cyclical communication process. Any free port can be used for engineering purposes. The IndraMotion for Handling system solution used by Rexroth supports this convenient function with consistent engineering tools for the control system and the drives. The drive-based control system implements a "point to point" movement. This allows users to execute larger blending movements and therefore save time during positioning. In addition, Cimcorp is committed to energy recovery. Recuperation ensures that braking energy no longer simply goes to waste as heat. Instead the Rexroth servodrives with energy recovery capability switch the motors to generator operation during braking and feed the electricity that is generated back to the system or supply network. By harnessing this energy and leveraging the reduced weight of the bridge, 40 percent less energy is consumed than with the previous TyrePick robot. At the same time, the reduced weight, innovative motion control system and Rexroth drives boost performance by 30 percent compared to the predecessor model.

The world's first gantry with energy recovery capability for the tire industry

IndraMotion MLD combines highly dynamic servo technology with powerful Motion Logic

The IndraMotion for Handling turn-key automation system resolves challenging handling tasks by way of a PLC. Even complex motions for assembly and handling can be programmed and taught in by the user from a handheld control unit. Rexroth incorporates IndraLogic open sequence control, compliant to IEC 61131-3, in IndraMotion for Handling, as is the case with all of its controllers. The common elements of the IEC 61131-3 standard ensure that, once created, program components can be reused even at different levels of automation, from PLC in the drive to PC-based control. As a result, users can conveniently call the motor functions as finished function blocks and assign variables as required. These blocks enable cyclic and acyclic access to all Motion Control parameters, providing a very wide scope of freedom for material handling.

As so often, sercos has once again managed to establish new applications beyond the boundaries of mainstream solutions through an innovative machine manufacturer, in this case Cimcorp. Particularly important is the fact that the sercos open standard enables TyrePick+ to be integrated in both new and extended production plants for tire manufacturing equally quickly and, by increasing energy efficiency, helps to significantly reduce CO_2 emissions. ■

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Shrinkpacker Smiflexi SK 600T: Simple Architecture for fast Format Changeover

More flexible, faster, easier: In the packaging industry more and more machine builders use sercos to reach a higher overall productivity with innovative machine concepts, for example Smigroup, a worldwide leading manufacturer of packaging machines. In its newest generation of shrink packers, the SK series of the Smiflexi division, the Italian Company uses sercos as universal bus for the complete automation and combines short format changeover times with a high throughput.

At Drinktec 2009 show Smigroup presented the newly developed Shrinkpacker SK 600T

At Drinktec 2009 show, Smigroup presented the newly developed Shrinkpacker SK 600T. It can pack a wide range of containers, like bottles, cans, jars into film, in film only, cardboard pad plus film, tray only, or cardboard tray plus film. "The batch sizes in mineral water, soft drinks and lemonades are decreasing because of the high competition and our customers care about short format changeover times," says Pietro Volpi from SMI. The electronic cam shaft of the machine with 16 compact Rexroth IndraDrive Cs servo drives reduces the changeover almost completely to software commands.

Italian-based company SMI is one of the world's largest manufacturer of hitech secondary packaging machines, and one of the leading manufacturers of rotary stretch-blow moulding machines. Smiflexi division markets about 300 shrinkwrappers and wrap-around casepackers every year, capable of output rates from 20 to 360 packs/minute. Smiform division produces approximately 50 stretch-blow moulders per year for the making of PET and PP containers.

The North Italian engineers decided to use the real-time communication sercos for all servo drives and I/Os in the new machine. "This simplifies the architecture and gives us the choice of components from different suppliers," states Pietro Volti. The MARTS 3000 control developed by SMI communicates over Ethernet with all actuators and I/Os from SMI, WAGO and Phoenix Contact. sercos controls 40 devices with a cycle time of 1ms. The simple integration of products of different suppliers with Ethernet interface reduced the engineering time by almost one third. sercos has implemented realtime mechanisms, profiles, telegram structure and synchronization from its predecessor. „Additionally, SMI has integrated innovative sercos functions such as redundancy into its new architecture," points out Luca Stanzani, Industrial Sector Food and Packaging of Bosch Rexroth in Italy.

Because of the hard synchronization of sercos and the highly dynamic servo drives, the SK 600T packs up to 60 packs per minute in single lane operation. All machine types of the SK series are designed by SMI for multiple

The electronic camshaft of the machine with 16 compact Rexroth IndraDrive Cs servo drives reduces the change-over almost completely to software commands

lane use with electric grouping of products. sercos technology of real time direct cross communication between controls enables machinebuilders and end users to synchronize different machines and modules easily. "With this technology all customers can configure their complete packaging lines for highly flexible Inline processes," underlines Pietro Volpi.

In addition, various innovative solutions reduce the time for format changeover: The self-adjusting product infeed guiding rails adapt automatically to the different pack sizes with almost no manual adjustment by the operator. All movements, starting from the grouping of products, unwinding of foils, to the automatic alignment of printed foil are controlled with the IndraDrive Cs servo drives, which have a performance range from 0.05 to 3.5 kW. The highly compact multiethernet IndraDrive Cs drives are the standard configuration with multiencoder interface for the most used encoder types. This simplifies the logistics for SMI and the end user, because one hardware covers all options within the machines.

The new SK 600T also reaches a high efficiency due to reduced energy use: "Users can produce the heat for the shrink tunnel with electricity or gas," explains Pietro Volpi – the automation components of both versions communicate via sercos with the controller. ■

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Why do a growing number of companies rely on sercos? We decided to find out.

Schneider Electric

Jens Bunsendal
Dipl.-Ing.
Marketing Manager
High Performance

What are the benefits of your company using sercos in automation technology?

Schneider Electric offers a broad spectrum of automation solutions. Along with product performance, short time to market, ease of maintenance and interoperability are important system design aspects. These elements are fundamental to our customers and as well as directly impacting Schneider's product development.

The sercos automation bus supports our efforts to achieve these objectives. Elements of sercos automation bus aid all aspects of the system lifecycle. The detailed profiles in sercos during the design phase ensure consistency between vendors and improves interoperability between different vendor's products. During startup and maintenance, features including auto addressing reduce errors and simplify the tasks. During operation and maintenance phases, redundant communication paths increases machine availability and provides precise information for efficient maintenance. By leveraging the features of sercos automation bus, we make our systems easier to design, deploy and maintain which adds value to our customers.

Why are you involved in the user organization sercos international? What are your objectives?

Besides the technical benefits, the independence of the organisation brings value for the suppliers and users of sercos automation bus. sercos is supported by multiple leading automation companies who cooperate in the specification development. No single company owns the technology or knowledge so the inputs from multiple, experienced suppliers contributes to the improvement of the specification. As multiple companies are involved, the interests of conformance and interoperability are paramount providing a high degree of confidence that products will interoperate. This model ensures a sustainable development and protects the investments of suppliers and user of the technology. ■

manz
passion for efficiency

Friedrich Scheurer
Manz Automation AG
Head of R&D Control
Technology / Mechatronics

What benefits does your company gain by using sercos for its automation technology?

With a highly detailed, 100 %-defined sercos standard as a basis, Manz is able to concentrate on its unique selling points while still using an extremely high-quality standard. With the independence of sercos and its multi-vendor-environment orientation, Manz is able to maintain its independence from component suppliers and combine "best price" with "best functionality."

Why are you active in the user association sercos international?

First, because of marketing and to multiply the idea of a high-level standard. Standards are widely effective in reducing costs. This becomes especially clear when you take the issue of safety as an example. Machinery producers do not benefit from this. It only serves to appease legislators. This is why standardization is the best response to this. Standardization beyond the company level is the logical continuation of technical progress: we are standing on the shoulders of the previous generation and not reinventing the wheel.

What objectives do you pursue?

We want to win over component manufacturers to support the sercos standard, which is ideal for mid-size companies. Users and component suppliers both benefit. ■

S Exhibitions 2011

Hannover Messe
April 4.-8. (Hall 9, booth A10)

AutomationExpo
April 21.-23. Chennai / India
(Hall 1, booth J-5/6)

FA/PA
May 18.-20. Beijing / China
(Hall 1, booth C003)

SPS / IPC / DRIVES Italia
May 24.-26. Parma / Italy
(Hall 5, booth M 065)

swissT.fair
June 16./17. Zurich/Switzerland
(Hall 5, booth E06)

swissT.fair
June 21./22. Yverdon-les-Bains/
Switzerland
(Hall 1, booth C06)

Automation 2011
September 20.-23. Mumbai / India
(Hall 1, booth D23)

Industrial Automation Show,
November 1.-5. Shanghai/China

System Control Fair
November 16.-18. Tokyo/Japan

SPS/IPC/DRIVES 2011
November 22.-24. Nuremberg/
Germany
(Hall 6, booth 110)

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