Guest article: Prof. Dr.-Ing. Jürgen Gausemeier
it’s OWL – WE ARE A
LEADING-EDGE CLUSTER

Dr. Frank Brode
ALWAYS ONLINE –
Smart Network Infrastructure

Thomas Wolting
BUILDING PRECISE RELATIONSHIPS –
Han-Fast® Lock

RESEARCH FOR INNOVATIONS!
HARTING is now also on Google+
HARTING is now providing you with information on the company on Google+. The company profile contents extend beyond the information available to you on our homepage and from press releases. On Google+ you can read something about day to day work at HARTING, individual job descriptions and the people at the company.

HARTING is now also on Twitter
We also recently went online with a company profile on the Twitter news service. There you can find news and valuable information on our products, as well as on trade fairs and other events. Be sure to check it out!

AS ALWAYS,
YOU CAN ALSO FIND US AT:
The central challenges of the 21st century result from the increasing globalization of the markets, burgeoning mega-cities, ever scarcer natural resources, but also the advanced ageing of societies in the industrialized nations. These global trends call for new concepts which will enable us to make more sustainable use of resources, retain the mobility of society, and elevate communication to new levels. The HARTING Technology Group regards the development of intelligent and flexible infrastructures as a crucial element in mastering these challenges. The HARTING vision comprises the insight that individual machines, devices and equipment must be increasingly endowed with their own intelligence. This applies to smart factories just as much as it does to our daily environment in our offices and at home. The power supply network represents the core area here: the existing infrastructure – from the power generators via the supply network and energy storage media through to end consumers – gains additional decisive intelligence in order to enable highly resource efficient operations.

CONDUCTING RESEARCH WITH STRONG PARTNERS

Based on this vision, the central technology area of the HARTING Group is engaged in the development of new manufacturing processes, the utilization of new materials (nano particles), the extension and further development of the product range, as well as the development of new solutions for smart infrastructures. These solutions combine new products that are equipped with sensors, electronics and software in order to achieve considerably higher efficiency levels of all company and societal processes.

These extremely demanding tasks can only be solved by close cooperation between the various research institutions, universities and partners involved. To this end, the HARTING Technology Group is drawing on a large, international development and know-how network, in which topics ranging from artificial intelligence through to nano technology are being researched. And as many examples demonstrate, HARTING's involvement is clearly characterized by the company's sustainable and long-term commitment: the construction of a new technology center in Espelkamp reflects this commitment as does the endowment of a guest professorship as well as many long-term research cooperation activities.

Wishing you enjoyable reading,

"The HARTING Technology Group maintains a large international development and know-how network, in which topics ranging from artificial intelligence through to nano technologies are researched."
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The technical systems of tomorrow will be based on the close interaction of mechanics, electric/electronics, control engineering, software technology and new materials and will exceed mechatronics by an inherent intelligence. Information technology and also non-technical disciplines, such as cognitive science, neurobiology and linguistics, are developing a variety of methods, technologies and procedures that integrate sensory, actuatorial and cognitive functions into technical systems previously known only in biological systems. We call such systems Intelligent Technical Systems; they are adaptive, robust, proactive and user-friendly. Intelligent Technical Systems adapt to their environment and the requirements of their users. They provide utility in households, in production, on the streets; they go easy on resources and are intuitively operable and reliable. Examples are a tumble dryer that adapts in seconds to changing electricity prices and nevertheless gives a premium drying result thanks to self-optimization; a production machine, which can be easily operated by the workforce even for the most difficult tasks and that knows when it is time for their maintenance; a large-scale...
close alliance of business and science in 47 projects product and production innovations are getting developed. The spectrum ranges from intelligent sensors, drives and automation components to machines, white goods and vehicles up to networked systems such as production facilities, smart grids and cash management systems, wherefore the term cyber physical systems stands. The projects are based on a mutual technology platform as the overall core of the cluster’s innovation leap. Smaller and medium-sized companies are participating from the developed cutting edge technologies via this technology platform and resulting transfer projects.

The companies in OWL face the challenge to develop and manufacture such systems for the markets of tomorrow. The award Leading-Edge Cluster is a great achievement and impressively substantiates the capability of the region, which is now widely visible in the Champions League of international high-tech regions. The further development of Germany as a site for innovation and production gains significant momentum by this activity.

Within the framework of the cluster it’s OWL 173 companies, industry initiatives, universities and research institutions have their sights on the innovation leap from mechatronics to these systems with inherent intelligence. Within a close alliance of business and science in 47 projects product and production innovations are getting developed. The spectrum ranges from intelligent sensors, drives and automation components to machines, white goods and vehicles up to networked systems such as production facilities, smart grids and cash management systems, wherefore the term cyber physical systems stands. The projects are based on a mutual technology platform as the overall core of the cluster’s innovation leap. Smaller and medium-sized companies are participating from the developed cutting edge technologies via this technology platform and resulting transfer projects.

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Intelligent Interfaces between Humans and Technology

Advanced technologies for human-machine interaction such as motion tracking, voice interaction and touch, gaze or gesture for control are rapidly developing and being put to practical use in such areas as entertainment or smartphones.

» Prof. Jochen Steil, Managing Director Research Institute for Cognition and Robotics (CoR-Lab) & Member of the Scientific Board in the Center of Excellence – Cognitive Interaction Technology (CITEC), University of Bielefeld
Dr. Sebastian Wrede, Head of Cognitive Systems Engineering, CoR-Lab & CITEC, University of Bielefeld

The complexity of technical systems is also increasing in automation, with the goal being the ability to react flexibly to customer requirements. The combination of these trends will shape the future of production and introduce intelligent interfaces that actively offer operating support and adapt to the user.

"WHAT DOES THE MACHINE ASKS FOR?"
People constantly face the task of interacting with technical systems. How to control a function, how to interpret feedback, where has an error occurred? Human-machine interaction provides supportive interfaces for solving such tasks efficiently with intuitive operation. The role it plays in industry is steadily growing, as the design of automation systems and their operation are also becoming increasing complex. At the same time these steps are required to be intuitive and reliable.

FLEXIBILITY FROM MODULARIZATION AND LEARNING
The advancing modularization of control technology and metrology, as well as open interfaces are allowing a flexible, software-driven view of the production process. This flexibilization not only promises manufacturing processes that adapt more efficiently, but also comprehensive real-time acquisition of process data. Their use is a further area in human-machine interaction (HMI) that is closely connected to statistical learning, for instance, in order to predict error states in a running process. For example, maintenance intervals could become dynamic if the system learns to predict the wear on a drill as the result of larger variances in other test sizes. This forecast is visualized in the simulation system in order to give the operator feedback on the state of the automation solution in an easy to interpret manner. Downtimes are minimized, resources are used more efficiently and communication between human and machine is improved.

INTUITIVE PROGRAMMING AND CONFIGURATION
The improvement of manufacturing processes, particularly by means of the flexible use of modern power-regulated robot components, is likewise crucially dependent on the intelligent use of human-machine interaction. At the Institute for Cognition and Robotics at the University of Bielefeld, researchers have developed the prototype of such a system that channels the skillful combination of force control and learning to configure an articulated robot in a few minutes in such a way that it can carry out very complex movements. The vision of intuitive on-site programming that allows even non-experts to
modify a system with little effort has been implemented in prototype form.

**HUMAN-MACHINE INTERACTION IN THE it's OWL CLUSTER OF EXCELLENCE**

The transfer of such current cutting-edge research from the University of Bielefeld’s excellence area is also playing an important role for the leading-edge cluster it's OWL. Joining forces with the HARTING Technology Group, implementation of intuitive communication between humans and machines in reference systems will pave the way to tying tomorrow’s more flexible production modes more and more closely to human-machine interaction.

**=> IN BRIEF**

- Modern technologies for human-machine interaction are developing rapidly.
- The improvement of manufacturing processes is crucially dependent on the intelligent use of human-machine interaction.
- Together with HARTING, it’s OWL is implementing intuitive communication between humans and machines in reference systems.
The demand for comprehensive access to all relevant information at all times is becoming the standard in the industrial environment. Whether in energy production, machine and production process control, project coordination or many other applications, networking is now at such a high level that human communication alone is no longer sufficient. Future-proof concepts and systems will have to satisfy these growing demands – and the Smart Network Infrastructure concept developed by the HARTING Technology Group provides the structure, products and systems capable of managing both today’s demands and tomorrow’s requirements.

Universal Information Availability

Infrastructures are becoming more and more important, and consist of far more than only connectors, cables and switches. They also comprise so-called sensor networks, which are integral system parts.

As a rule, powerful software that provides the indispensable intelligence in the system is a crucial component in these innovative solutions. The software’s performance, such as the capability to process large data volumes in real-time, is increasingly being seen as a differentiation characteristic. The HARTING Technology Group has therefore targeted its focus on developments in this field.

Management Jobs

The network infrastructure has traditionally been seen as a straight-forward connection among intelligent devices. But this is rapidly changing, and the infrastructure software is becoming increasingly important.

This development has led the HARTING Technology Group to create a dashboard in order to visualize all the necessary information regarding the infrastructure. By combining all HARTING managed devices in one interface, an industrial network’s entire infrastructure can be conveniently administered. The software automatically identifies the topology and continuously updates this in the background without having to interrupt applications or cut off the system. This approach considerably reduces the system administrator’s workload. The open architecture additionally allows the Ha-VIS Dashboard to integrate devices from third-party manufacturers and to fulfill certain international communication standards.

The New Challenges

Real-time or close to real-time processing has meanwhile become a require-
ment for efficient process controllers in distributed networks and applications. Information must be continuously analyzed, promptly and in context, in order for a system to detect trends, identify exceptional situations early on and react automatically in good time.

But also incorporated are automated decision processes in which it is necessary to distinguish which data packets are relevant and then to give these relevant packets priority. The Fast Track Switch technology (FTS) represents a crucial step for the HARTING Technology Group towards sustainably satisfying these requirements and allowing protocols and messages that require real-time or determinism to be prioritized beyond the automation level. Fast Track Switch is consequently the most important determinism gateway for corporate networks in order to bring to life such innovative system concepts based on the ideas of Complex-Event-Processing (CEP) and Real-Time-Event-Processing (RTEP).

OUTLOOK
The integration of new technologies into the HARTING Smart Network Infrastructure system solutions will make it possible to implement new applications sustainably and flexibly.

CEP – extra reading material:
1. Luckham, David: The Power of Events: An Introduction to Complex Event Processing in Distributed Enterprise Systems, Addison-Wesley Professional, 2002
3. Gesellschaft für Informatik e.V. (GI)
Beyond the Status Quo

The Federal Program “Industrie 4.0” and HARTING’s Automation IT are setting up a cooperative network for all enterprise applications.

Andreas Huhmann, Strategy Consultant Connectivity & Networks, Germany, HARTING Technology Group, Andreas.Huhmann@HARTING.com

The HARTING Technology Group has established Automation IT as the communication platform for all applications in manufacturing companies. Within the context of Germany’s national “Industrie 4.0” program, HARTING is advancing Automation IT beyond the status quo as it continues to further extend intelligent networking in the production area.

The advent of Ethernet as communication standard for automation has fundamentally opened up network designs. The applications, however, have not kept pace with this development. In particular, this is problematic because new requirements demand closer cooperation among the various applications. It is necessary to integrate ERP (Enterprise Resource Planning) software, MES (Manufacturing Execution System) and SCADA (System Control and Data Acquisition) systems, control systems and energy management systems. Energy efficiency, for example, cannot be achieved by one single approach. Sustainable process optimization is not possible unless the various enterprise applications work together.

COOPERATIVE ENTERPRISE APPLICATIONS
The necessity of barrier-free cooperation among the various enterprise applications was not given priority in the past, which is one reason that automation
development has taken a completely different path than the company’s IT has. As a consequence, classic automation set up an application-specific network. Communication from the automation field bus to other enterprise applications was implemented via gateways. Devices in the automation network were and still are always assigned to a specific automation application and connected by means of the field bus in a linear topology below a master controller, the classic PLC (Programable Logic Controller) system.

The introduction of Ethernet as the communication standard for automation has fundamentally opened up network designs, and has also resulted in topological freedom. Although the master controller still exists in functional terms in many instances, it can now be flexibly integrated into the network. In terms of other enterprise applications, the controller is preferably the logical transfer point for information and takes on a gateway function.

Consequently, the physical networks form a uniform and convergent communications platform. The applications used on this communications platform are for the most part logically independent, however. There was no motivation from the perspective of the automation application to give up this independence because classic

With the cooperation of different enterprise applications down into the field level, HARTING is now one crucial step closer to making the automation IT vision a reality.”

HARTING tackled the topic of energy efficiency in the framework of smart Power Networks. One key area is the use of a convergent Ethernet network that helps manage the Power Network. Network management is simplified by the use of IT technology, such as SNMP. The terminal devices needed for the application, the smart Power Units, are made available to applications. HARTING is currently intensively working on integration into the automation control and regulation levels and in energy management systems. HARTING will be presenting the smart Power Units and their integration at the Hannover Messe 2012.
Automation always functions in a self-sufficient manner, which is also necessary for safety reasons. This approach, also called an automation island, is not critical as long as it is not necessary to share information among enterprise applications in order to control the overall process. But this information exchange is exactly what new applications are demanding.

ENERGY EFFICIENCY AS A TASK FOR THE FUTURE
Energy efficiency calls for a high level of cooperation among enterprise applications. The question as to exactly which applications need to be examined here in detail was evaluated in the context of the cooperation between HARTING and the Deutsche Forschungszentrum für Künstliche Intelligenz (DFKI, German Research Center for Artificial Intelligence): (Info).

Given the many function areas of the different enterprise applications that have to be considered in the framework of energy efficiency, it is not possible to assign energy efficiency to a single application.

Naturally an energy management system and manual intervention in the production process can help optimize energy use and reduce consumption. But this approach can take only long-term effects into account. Moreover, it cannot be automated, and cannot react flexibly to constantly changing conditions such as widely fluctuating electricity prices. Sustainable process optimization is consequently not possible unless the different enterprise applications work together in the framework of process optimization. Individual scenarios, such as pause management, underscore this.

Putting a production facility into standby mode is the controller’s job. But the controller must have basic information in order to take this step, such as the time and duration of the pause. It would also be conceivable to make the pause times flexible and correlate them with energy availability.

COOPERATION WITH AUTOMATION
One essential reason for the lack of cooperation among applications in production can be seen in the concept of industrial automation communication. This process takes place in cycles as a rule. A central controller communicates with the distributed users in a fixed cycle, in full knowledge of the network’s topological characteristics. This is the only way to ensure that the information

INFO

- For ERP software, these were the production, financial and accounting (cost center allocation) and controlling (allocation of energy costs to the product) areas.

- For MES/SCADA systems, the recording of production and product data (energy data are recorded in a manner similar to that for working hours, personnel, product, etc.) and the control of production orders have to be considered.

- In control and management systems, the main topics comprise the control and regulation of processes, such as starting, stopping, stand-by management and pausing (based on external specifications, such as those from the energy management system).

- Energy management systems, on the other hand, require primarily data processing and analysis, load management, for example, as pause management, and support of the requirements defined in DIN 16 001.
arrives at the receiver on time and at a guaranteed point in time.

This coupling of the application and the network by means of a defined time response is unknown in office IT, where services are formed that are combined into complex services in the framework of orchestration. The network must ensure some defined performance for individual applications.

One way to allow applications in the industrial environment to cooperate is to structure automation as a service oriented architecture (SOA). In an SOA, simple processes are combined into one complex process. To use this complex process, it is sufficient if the interfaces are known, and it is not necessary to have information on the simple processes. SOA architectures offer considerable advantages for integration in enterprise applications, as the first demonstrators of the DFKI in Kaiserslautern show: The utilization of IT technology equivalent to Office IT accordingly leads to innovative automation solutions, and in particular, this also translates as more powerful solutions.

SOLUTIONS INVOLVING THE HARTING Ha-VIS Dashboard

There are a number of ways to coordinate applications from the company IT and automation areas. The HARTING Ha-VIS Dashboard is situated below the enterprise applications and above simple communication. While this allows the entire network structure to be managed, it can do more.

The Dashboard Service, for instance, offers seamless integration of RFID (Radio Frequency Identification) and intelligent smart Power Units into enterprise applications. The smart Power Units can be integrated into the control technology by means of a PROFINET I/O stack and into enterprise applications such as ERP and MES by means of service interfaces. But this integration is also only a necessary beginning. HARTING is working on developments to facilitate the interconnection of enterprise applications. The goal is to set up logical connections among the individual applications in order to achieve energy-efficient production.

With the cooperation of different enterprise applications down into the field level, HARTING is a crucial step closer to making the automation IT vision a reality. The convergent Ethernet communications platform here forms the basis for communication among the applications, but it is necessary to interconnect the applications in order to optimize the product process sustainably.

• Ethernet’s introduction as the communication standard for automation has fundamentally opened up network designs.
• SOA (Service Oriented Architecture) offers one way to achieve cooperation among applications in the industrial environment.
• The HARTING Ha-VIS Dashboard makes it possible to manage the entire network structure.
Service-oriented architectures (SOA) in Business IT increase flexibility and interoperability through the use of openly accessible and reusable services. The concept is now also being applied in automation (SOA-AT) where it is showing great potential.

» Dipl.-Ing. Lisa Ollinger, Technical University Kaiserslautern
Dr.-Ing. Jochen Schlick, Deputy Head Innovative Factory Systems IFS, German Research Center for Artificial Intelligence (DFKI) GmbH
Dipl.-Ing. Stefan Hodek, German Research Center for Artificial Intelligence (DFKI) GmbH

"The concept of service-oriented architectures (SOA) has been an established element in information technology for several years and is used primarily in business processes."
The concept of service-oriented architectures (SOA) has been an established element in information technology for several years and is used primarily in business processes. To begin with, SOA is an abstract concept for software architectures that represents different methods or applications as reusable and openly accessible services and in this way allows platform-independent use and reuse.

In order to apply the SOA idea to industrial automation technology, all control functions within a factory control system must be encapsulated as services. At higher levels in the automation pyramid, these are nothing more than software-only components found in SOA-IT. At the lower levels, however, services are not software-only functions, and instead they represent mechatronic functionalities for executing real technical processes. These services can act on the physical state of mechatronic components in order to influence the technical process directly. Unlike software-only services, here the location at which the service is executed and the current state of the technical system play an important role. A well-known SOA guideline recommends that services preferably be implemented with statelessness in order to allow them to be used independently of inner states. A mechatronic component can have a physical state, such as a cylinder's current position, and this can have a relevant influence on the production process. In order to specify such a service precisely, a description of the hardware and an exact indication of the location are necessary, along with the description of the software's functional range. Table 1 lists the most important differences between SOA-IT and SOA-AT.

As a result of these differences, the use of SOA for automation tasks fundamentally differs from classic SOA applications. Above all, the general conditions and requirements are completely different from those in classic SOA appli-
cations for business processes, so that other procedures, methods and technologies are required that systematically support the use of SOA in automation while allowing optimal implementation.

**DEFINITION AND BENEFITS OF SOA-AT**

The specific approach of SOA in automation, which we call SOA-AT here, defines the conceptual framework for the use of SOA for automation tasks in the industrial factory environment. The underlying idea is the development of an integrated control architecture based on the paradigms of service-oriented architectures. Such a service-oriented control architecture is characterized by the following properties: The use of standardized communication interfaces and protocols as well as the functional encapsulation of mechatronic and control functions into services. Here, the elementary functions of the field devices, which act as the interface to the technical process, are called basic services. These can then be orchestrated into higher order services in control programs and called via their standardized service interfaces. Figure 1 shows such a service-oriented control architecture by way of example. Communication among all components here takes place through service calls.

Because of the standardized interface description of the services and the use of standardized communication protocols, the services can be called across levels, which considerably simplifies the vertical integration of automation components with higher levels. The integration effort when exchanging or adding components can likewise be considerably reduced in this way. In addition, the control programming is fundamentally changed because the control logic is no longer implemented by processing I/O signals, and can instead be raised to a more abstract level through the use of services. This then has the potential of allowing the control project planning to be carried out largely independently of the hardware, which considerably increases the flexibility of planning and reconfiguration processes, minimizes the programming effort and ensures greater reusability of the control programs. A precondition for this is a general service specification that is independent of the respective manufacturer and that is based solely on the component functionality, as well as a suitable planning method that fully supports the advantages of the service orientation.

**DEMONSTRATOR**

The demonstrator shown in Figure 2 is used for evaluating the concepts regarding SOA-AT development. The example production process consists of filling piece goods followed by a subsequent quality check. The precise order data here are stored directly on the product with the help of an RFID tag (Radio Frequency Identification Tag), instead of being stored in a central database. The originally designed hardware and software configuration was enhanced so that all devices had service gateways on which the service was implemented. Microcontrollers were used for a service expansion of the field devices and the central PLC (Programmable Logic Controller) was replaced with an industrial PC. The microcontrollers were connected to the PC via Ethernet, and set up the connection to the field devices such as frequency converters, RFID read-write devices, induction and ultra-
sound sensors, a camera and others. The connection of field device and microcontroller was developed and implemented individually in this case, depending on the field device’s respective interface (PROFIBUS, I/O signals, RS232, etc.).

### EVALUATION AND OUTLOOK

The SOA-AT concept is the basis for the systematic planning and implementation of service-oriented automation systems in industrial factory environments. New methods and guidelines based on these systems need to be developed in order to support and establish the use of SOA-AT. The focus is on the optimal definition of services, which depends on aspects such as statelessness, loose coupling, reusability, uniqueness, etc. It is essential here to consider a step-by-step introduction of SOA-AT for the compatibility of old and new technologies in order to gain acceptance for the approach.

Because the implementation of service-oriented technologies today is usually characterized by a high level of effort, there is a need for standardized process description languages for ad hoc orchestration of production processes, cross-manufacturer semantic device and system models for computer-supported planning and commissioning and operation of production plants, as well as tools for efficient setup and handling of service-oriented architectures in production.

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### Table 1: Comparison of SOA-IT and SOA-AT

<table>
<thead>
<tr>
<th>Application domain</th>
<th>SOA-IT</th>
<th>SOA-AT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service definition</td>
<td>Software encapsulation</td>
<td>Mechatronic functionality encapsulation</td>
</tr>
<tr>
<td>Service specification</td>
<td>Software functionality</td>
<td>Mechatronic functionality + Hardware description + Location</td>
</tr>
<tr>
<td>Location transparency</td>
<td>Independence of the service provider location</td>
<td>Dependent on the location of the service provider</td>
</tr>
<tr>
<td>Statelessness</td>
<td>Stateless software + protocol</td>
<td>Process dependent on the hardware state</td>
</tr>
<tr>
<td>Loose coupling</td>
<td>Modular programming with high cohesion</td>
<td>Modular programming + mechanical construction</td>
</tr>
<tr>
<td>Target</td>
<td>Distributed applications</td>
<td>Execution of technical processes</td>
</tr>
</tbody>
</table>

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### IN BRIEF

- Service-oriented architectures (SOA) in Business IT increase flexibility and interoperability through the use of openly accessible and reusable services.
- The SOA-AT concept is the basis for the systematic planning and implementation of service-oriented automation systems in industrial factory environments.
Ensuring a Competitive Edge

HARTING Corporate Technology Services (CTS) handles testing and inspection work for the entire HARTING Technology Group and is responsible for strategic technology development within the group.

» Dr. Stephan Middelkamp, Consultant Strategic Technology Development, Germany, HARTING Technology Group, Stephan.Middelkamp@HARTING.com

"The laboratory's test range is constantly being expanded and adapted to new technologies, markets and products."

Arc generated in the plasma vacuum coating system.

Slice through a track of a 3D-MID component as imaged by the focused ion beam.

Image of the HARTING PushPull Power 48 V made with computer tomography.
The HARTING Technology Group is one of the most research-intensive industrial companies in Germany. The Group’s focus extends well beyond merely enhancing the product range. HARTING thinks and works in a more radical manner: Basic research on the one hand and demanding test programs on the other ensure the competitive know-how edge in one of the world’s most dynamic industrial sectors. The central Corporate Technology Services (CTS) department handles these two core jobs within the HARTING Technology Group. HARTING testing professionals have access to the most advanced, leading edge laboratory equipment and test instruments.

QUALITY AND INDEPENDENCE
The fully equipped CTS laboratory holds ISO/IEC 17025 accreditation, which guarantees the quality and independence of all results. The tasks performed include qualified electrical, mechanical and climatic testing, tests of signal integrity and fiber optics, software tests, tests of electromagnetic compatibility, examinations of coatings and material properties and dimensional tests - in other words, virtually everything that contributes to ensure the success of HARTING products.

The laboratory’s test range is constantly expanded and adapted to new technologies, markets and products. For example, testing capacities for ultraviolet radiation, sun simulations and ozone tests were expanded in line with the enlarged requirements for products used outdoors. With regard to the rail sector, a jumper cable testing facility was set up simulating the movement of cables at the transition points between two wagons. The developments in the field of intelligent infrastructures and the increasing networking of different systems have necessitated appropriate software tests. These tests cover such areas as the software for managed switches and RFID readers, which HARTING develops itself as a system supplier.

CTS also handles the enhancement of test and inspection methods. For example, 3D measurements are carried out in the laboratory using a CT scanner as an enhancement of the conventional optical measurement in 2D. HARTING also acquired a focused ion beam for material analysis.

CTS WORKS WITH HIGH-RANKING PARTNERS
In developing new technologies, CTS works with renowned research institutions, such as the TU Berlin in a project funded by Germany’s science ministry. CTS furthermore directly commissions research projects and supervises student research projects and thesis.

Intensive research projects are carried out in CTS with a special eye to further developing HARTING technology platforms, such as 3D-MID (Molded Interconnect Devices). The objectives here were, for example, to expand the material range by verifying the reliability of low temperature solders and to develop colored plastics suitable for LDS (Laser Direct Structuring). The latter provided HARTING developers and their customers further latitude for developments.

NEW DEVELOPMENTS
The CTS testing possibilities also support the development of new products. For example, measurements of the current-carrying capacity were carried out for the Han-Fast® Lock, a PCB connector for high currents, during the development stage. This allowed the units to be optimized. The qualification and introduction of a conversion coating that considerably increases the corrosion resistance of Han® housings also resulted in direct customer benefits.

Moreover, long-term projects that are driven by global trends have also been started. As a result of diminishing resources, substitution solutions for the raw materials in use are an important topic. An internal test facility for plasma vacuum coating allows the application of nano-coatings whose properties can then be tested and qualified in the test laboratory.
Building Precise Relationships

Power electronics places stringent demands on connection technology: PCBs must be quickly and reliably connected to Han® industrial connectors. This process is flexible, convenient, simple and possible without additional components thanks to Han-Fast® Lock.

» Thomas Wolting, Product Manager, Germany, HARTING Technology Group, Thomas.Wolting@HARTING.com

Numerous sectors place strict requirements on power electronics: Compact and highly efficiently solutions are called for in markets such as renewable energy, transportation, robots and automation, where applications are characterized by rough environments and therefore high protection classes. Here, the Han® connector offers ideal characteristics on the housing side.

In principle, the requirements on the housing itself are known; solutions have been developed here and have proven themselves in the field. Power electronics itself must satisfy tougher requirements. In short, the electricity must make its way from the Han® connector to the PCB. The HARTING Technology Group has found the perfect solution in this regard: With the Han-Fast® Lock, the Han® connector connects to the PCB easily, quickly and economically.

INSIDE LOOK

The Han-Fast® Lock satisfies the requirements of high currents paired with simple handling and efficient size, without it being necessary to add additional components to the PCB.

This translates as distinct advantages in application design, during assembly and during servicing. Flexibility and simple handling for service and maintenance are therefore also two of the central requirements on products in power electronics, while no impairment of the connection’s performance and reliability is allowed. This is necessary in order to optimize the total costs for PCB production and minimize the device costs (Total Cost of Ownership). The prefabricated connector unit consisting of the Han® connector and Han-Fast® Lock PCB termination allows simple and error-free assembly.

PCBs are easy to create with the Han-Fast® Lock. There is no secret to bringing currents of up to 60 A on to the PCB. But only the Han-Fast® Lock makes it possible to set up compact, flexible and simple contacting. Only one contact point is needed for the connection. The printed conductors are throughplated and given a bore hole and support point. No further preparations are required. This makes it possible to deal with the technical requirements and thermal
management without positioning costly extra components.

**SIMPLE PROCESSING**

Processing the Han-Fast® Lock connection element is simple. A hand crimping tool can be used for small lot sizes, while larger lot sizes can be processed with fully automatic machines. The Han-Fast® Lock connection element is delivered on a coil, making it possible to add the stranded wire quickly and automatically. Device manufacturers can enlist prefabricated systems.

Stranded wires up to 10 mm² can be used with the Han-Fast® Lock connection element. The contacting on the PCB is just as simple as the fabrication. The assembled contact is inserted into the prepared PCB. The locking is a part of the Han-Fast® Lock. The provided pin is pressed against the PCB for locking. The function is as easy as can be and is comparable to a commercially available push button.

**WITH THE HAN-FAST® LOCK, THE HAN® CONNECTOR CONNECTS TO THE PCB EASILY, QUICKLY AND ECONOMICALLY.”**

**IN BRIEF**

- Han-Fast® Lock satisfies the requirements of high currents paired with simple handling and efficient size.
- The prefabricated connector unit consisting of the Han® connector and Han-Fast® Lock PCB connection allows simple and error-free assembly.
- Only the Han-Fast® Lock makes it possible to set up compact, flexible and simple contacting.
Fast FTS Performance for All

HARTING is supporting the construction of real-time networks with its Fast Track Switch (FTS) performance for prioritizing automation data. Now the company Hilscher is also supporting FTS as a chip solution for end units. This results in an overall system with an integrated and flexible design.

» Anja Dienelt, Product Manager Ethernet Switches, Germany, HARTING Technology Group, Anja.Dienelt@HARTING.com

The fact that FTS is an advanced switching technology is essential to the use of FTS technology. Comparable to store-and-forward or cut-through, Fast Track Switching is a standard Ethernet technology component implemented in a switching matrix. All identifiable protocols such as Modbus/TCP, PROFINET and Ethernet/IP can be accelerated deterministically by FTS in a cut-through method and transported from hop to hop at guaranteed minimum times. The identified data are accelerated at a high priority and can pass obstructing non-priority data on the Fast Track. It is crucial that when FTS is used in the network, no further steps need to be taken on the terminal unit side. The network itself guarantees the determinism. This is also why no consideration was given to setting up a user organization for examining all products for conformity. HARTING customers can set up deterministic real-time networks by opting for Fast Track Switches.

FTS NOW ALSO SUPPORTS LINEAR STRUCTURES

The FTS Switch has gained acceptance on the market and met with unanimously positive response. HARTING, however, is pursuing an open market strategy in the sense of an integrated approach. For example, the company Hilscher is now also supporting Fast Track Switching and showcased the latest generation of netX real-time Ethernet controllers at SPS/IPC/DRIVES 2011. The netX contains Fast Track Switch functionality, while netX 51/52 can additionally implement the complete transfer protocol with the integrated ARM CPU. The abovementioned profiles can be deterministically accelerated with Fast Track Switching and these ASICs. The chip is competitively priced with two integrated PHYs. The market targeted consists of device manufacturers who produce products such as I/O components for classical use in linear structures in the machine or plant. The two companies have agreed to keep the Fast Track Switching technology compatible and to continue developing it. The respective tests have been
completed very successfully. As a result, it is possible to set up integrated networks in a linear topology consisting of FTS switches and end units with an integrated FTS 3-port switch. Although Fast Track Switches are compatible with non-FTS devices and can be used in a mixed environment, the fewer hops of other types that are connected in between the better the performance for the entire automation section will be, and all data will arrive on time.

**IN BRIEF**

- The network itself guarantees the determinism.
- Integrated networks in a linear topology consisting of FTS switches and end units with an integrated FTS 3-port switch
The Ha-VIS Dashboard developed by the HARTING Technology Group acts as central operating and management software for Ethernet networks. The software handles such tasks as centrally administering managed Ethernet devices, monitoring Ethernet networks, as well as managing events and alarms, and monitoring performance.

The HARTING Technology Group developed the Ha-VIS Dashboard especially for monitoring, setting up, and maintaining complex and powerful IP-based communication networks. The Dashboard is capable of recognizing and administrating up to 256 network devices. The application areas range from network infrastructures in industries to extensive areas in energy technology and all the way through to transportation applications.

TOPOLOGY DETECTION
The software detects manageable network units and is capable of representing the network topology automatically. All intelligent HARTING network components, currently the switches in the mCon and Fast Track family and the RF-R500 RFID reader, can be centrally monitored and administrated. Compatibility with new developments in the future is guaranteed. Moreover, the software is open in terms of network components from third-party manufacturers.

AUTOMATIC EVENT PROCESSING
HARTING’s Ha-VIS Dashboard makes it possible to configure detected devices centrally via the Web, SNMP, Telnet or SSH (Secure Shell) interface. Link down and link up events are detected and visualized. Events, which also include received SNMP (Simple Network Management Protocol) traps, can automatically trigger actions such as an E-mail notification or program call. This flexible configurable functionality improves the response time to events in the network.

ANALYSIS AND STATISTICS
In addition to straightforward monitoring and administration of Ethernet network, the Ha-VIS Dashboard also offers analysis options. The software is able to sample the network load in cycles for selected connections on a port by port basis, and subsequently displays the results in a self-scaling diagram.

Recording the network load
FLEXIBLE INTEGRATION OF EXTERNAL PROGRAMS
It is possible to integrate calls of external programs into the Ha-VIS Dashboard menu structure by means of configuration. In this way, the Ha-VIS Dashboard serves as a central visualization and management software.

IN BRIEF

- HARTING developed the Ha-VIS Dashboard especially for monitoring, setting up, and maintaining complex and powerful IP-based communication networks.

- The software detects manageable network units and is capable of representing the network topology automatically.

- The Ha-VIS Dashboard is open in terms of network components from third-party manufacturers.

Automatic topology detection
Small Intelligence Package

Energy flow control is becoming more and more important. The HARTING Technology Group is now presenting smart Power Networks – a highly practicable and sustainable concept.

» Markus Simons, Product Manager Power Networks, Germany, HARTING Technology Group, Markus.Simons@HARTING.com
John Witt, System Application Manager, Germany, HARTING Technology Group, John.Witt@HARTING.com

Rising costs and pressure from lawmakers are not to be overlooked: Energy-intensive companies would do well to take a thorough look at their energy consumption. In this context, there are two basic approaches to possible solutions: The minimum objective is to set up a passive energy management system that concretely and clearly matches consumption levels to the consumers.

The far more powerful approach is active energy management, which controls the consumption and use of energy. In this case, energy is only used when it is really needed. Such a system controls the loads in the supply network with precision.

Working with this requirement profile, developers at the HARTING Technology Group have created the concept of HARTING smart Power Networks, which efficiently combine hardware and software solutions in one package. The complete system consists of the smartPN-Unit (smart Power Networks-Unit), the application cabling, the energy measuring devices and the software. Hardware and software are precisely tuned to each other, as the system architecture comes from HARTING.

The data from the distributed energy measuring devices are acquired and processed by a smartPN-Unit, for example, in a system's main distribution unit, enabling energy consumption to be registered and recorded. This data can be prepared, visualized and documented for the ISO 50001 and DIN 16 001 standards.

The smartPN-Unit gathers data using standardized interfaces and forwards them via Ethernet. They are stored in a database, and can also be prepared for external applications. Moreover, such data can also be fed back into the manufacturing processes.

This database is very informative, and serves to arrive at precise conclusions regarding the system's actual energy consumption. A number of standard reports can be drawn up on the basis of 15-minute data, and user-generated reports can be added to these as required. Comparative reports, for example, regarding the consumption data for the previous year, are possible by accessing the data archive. Naturally, the data material can be exported or used in other systems. The system also allows user and authorization administration. Snap-shot views of the process analysis can be generated on the basis of 1-second values.

The system features a convenient design that allows users to make the most of the system without having programming skills. Interventions to optimize energy consumption are easy to carry out. System installation is flexible and extremely economical. Break times can be meaningfully used for saving energy, such as by switching compressed air, heating or cooling off and on. Parameters can be adjusted to detect deviations at an early stage, so that countermeasures can be initiated.
• The smart Power Networks concept efficiently combines hardware and software solutions.

• The database serve to arrive at precise conclusions regarding the system’s actual energy consumption.

• The system is easy to use, flexible, and economical.
Powerful diagnostic devices for harsh environments

The use of radio-frequency-based identification and information processing during repairs and maintenance with RFID is further perfecting automation. Applications under harsh environmental conditions, such as railroad, transportation and energy technologies, are profiting as result.

» René Wermke, Product Manager RFID Transponder, Germany, HARTING Technology Group, Rene.Wermke@HARTING.com

MRO (Maintenance, Repair and Overhaul) holds great potential in automation, while substantial progress is possible thanks to the introduction of RFID system components (Radio Frequency Identification). Here, the HARTING Technology Group’s focus is, on one hand, to the energy market which has great growth potential, for example turbine maintenance and energy distribution in this case. On the other hand, HARTING RFID developments also focuses on railroad technology (transportation).

Working with long-time HARTING customers, the developers are working on new solutions and concepts especially for the requirements in railroad technology maintenance management. Components from the Ha-VIS RFID series are particularly suited for use in this area and impress with robustness, reliability and longevity, all indispensable prerequisites for applications in these market segments that are characterized and determined by harsh environments.

The necessity of maintaining an ongoing history and consequently data volumes that grows continuously at the component level during the life cycle leads to larger storage capacities in combination with a read range that greatly exceeds 1.5 meters. Given this background, medium-term developments with integrated sensor systems are both possible and profitable. Consequently, HARTING will be maintaining its position as a pioneer of technical innovation in the RFID segment in the future.

» IN BRIEF

- RFID in use during maintenance, repairs and servicing
- Ideal for harsh environments
- Strong focus on railroad and energy technologies
Working Towards a Standard

The HARTING har-flex® product series introduced in 2011 for connecting printed circuit boards is opening up flexible design possibilities for industrial devices.

» Andreas Huhmann, Strategy Consultant Connectivity & Networks, Germany, HARTING Technology Group, Andreas.Huhmann@HARTING.com
Michael Seele, Product Manager har-flex®, Germany, HARTING Technology Group, Michael.Seele@HARTING.com

Tomorrow’s standard? The history of industrial control engineering shows that the success of har-flex® can be attributed to the logic of developments to date: When industrial controllers were just being introduced, the focus was on freely available, nonspecific connectors. Consequently, connectors according to DIN 41612 form the foundation of the rack systems standardized in IEC 60297 that were in widespread use at that time.

The product designers departed from these very open architectures in the second generation: In addition to a proprietary control unit, a backplane was used only for the I/O plug-in units.

In a further evolutionary step, the classic rack was replaced. The manufacturers created individual modules without plug-in frames. These individual interconnected modules were plugged directly into a controller without a rack and backplane. The connectors were created in connection with specific solutions that were optimally adapted to the interconnection method and were implemented as an integral part of the automation modules.

Now a new generation has arrived in the connection technology for industrial controllers. The existing proprietary connectivity solutions are neither profitable nor technologically suitable to meet more stringent competition requirements. This is pushing freely available and nonspecific solutions such as har-flex® to the foreground.

har-flex® connectors offer optimal capabilities for the connectivity segment as they deliver the required robustness in combination with extremely compact size. The variety of sizes and contact arrangements enable the optimization of module design. SMT termination technology (Surface Mount Technology) and packaging compatible with automatic machines allow economical mass processing during the manufacturing. In this way, the HARTING Technology Group is continuing the approach taken by DIN 41612 connectors and offering innovative connection technology for industrial control systems.

➔ IN BRIEF

• Robustness in connection with the most compact sizes
• Flexibility thanks to the variety of configurations
• Cost savings based on SMT technology
Robots whose control and energy supply are guaranteed by Han-Yellock® swiftly and precisely carry out operations such as sorting, positioning and packing.

» Frank Quast, Head of Product Management Han®, Germany, HARTING Technology Group, Frank.Quast@HARTING.com

SCARA ROBOT SYSTEMS

It would be hard to imagine modern manufacturing without the robot systems grouped under the term SCARA (Selective Compliance Articulated Robot Actuator). Because of their fast movements, this type of robot was developed especially for so-called pick-and-place applications, in which components are moved from place (a) to place (b). What makes these machines special is their ability to compensate for joint tolerances.

Robots can be made to fit almost any position into which a part, such as a cylinder, is to be fit is defined, almost any robot can carry out the operation. But the joining process cannot be carried out if there are minimum deviations. This restriction does not apply to SCARA systems, however. SCARA is able to make adjustments automatically in order to equalize position deviations and complete the step.

ROBOT CONTROL

In recent years, the performance of the SCARA robots has steadily improved, while the installation of the devices has simultaneously become simpler and more flexible. This has resulted in the use of efficient interfaces – and this is where HARTING components come in.

SCARA systems are controlled and integrated into existing production lines and sequences by controllers. The power contacts for transferring the currents for the kinetic energy must work reliably and without interruption, even if the robot is subjected to vibrations. This is why the Han-Yellock® interface contains a true power pack – the Han® EEE module. It has 20 contacts, each of which can transfer 16 amperes at 500 volts working voltage in the most compact space.

The robot unit comprises functions such as torque monitoring, self-diagnosis and interrupt functions, which is why insulator modules for I/O transmission are also integrated into the interface. The individual modules can be assembled separately and locked into place in the housing frame without the need for tools. Rounding out the program is the no-lever housing series that perfectly blends in with the controller appearance thanks to its minimum space requirements.

Manufacturers are working at full speed to miniaturize the SCARA concept in order to reduce the required space even further. The trend is towards lighter models that work more efficiently due to the reduced masses.
IN BRIEF

• Modules can be assembled separately and locked into place in the housing frame without the need for tools.

• Design conveys the value of the overall system.

• Vibration-proof contact transfer
All-rounder

Han-Modular® is a modularly constructed contact insert that allows signal, power or even pneumatic modules to be combined freely to an individual connector.

» Heiko Meier, Product Manager, Germany, HARTING Technology Group, Heiko.Meier@HARTING.com

The HARTING Han-Modular® system combines numerous possibilities that would otherwise have to be split up among expensive special connectors or separate solutions. It is possible to create pluggable connections for currents from a few milliamperes to 200 A, voltages from 50 to 5,000 V, pneumatic tubes, data lines, shielded bus signals, and optical waveguides in POF (Polymer Optical Fiber) or glass fiber. In combination with housings for the specific environment - made of plastic or metal, for inside or outside use - it is possible to put together connectors perfectly coordinated to the specific use and yet capable of satisfying any particular application.

The system makes it possible to reduce the number of interfaces and benefit from significant space reductions, which in turn means greatly reduced costs with a high flexibility level. New additions are constantly joining the series. The most recent additions are the Han-Eco® plastic housing and the Han-Modular® docking frame.

The Han-Eco® portfolio with many different hoods, bulkhead-mounted housings, surface-mounted housings and cable-to-cable hoods is available in the sizes 6B, 10B, 16B and 24B and can be assembled swiftly and economically.

The Han-Modular® docking frames allow blind mating when used with drawers as found in low voltage switching devices, MCCs, battery systems or test equipment. These mechanically very robust plastic frames are available for 2, 4 and 6 modules, and have a large tolerance compensation of +/- 2 mm thanks to a floating support, which increases flexibility while keeping the costs low.
OWL Culture Prize for HARTING

The HARTING Technology Group has been awarded the first OWL Culture Prize in the “Large Company” category acknowledging its outstanding overall commitment to culture in Espelkamp and the surrounding region. At the award ceremony, Dietmar Harting emphasized the significance of culture as a formative factor, saying that it contributes to a company’s success and increases the appeal and attractiveness of the entire area. Margrit Harting confessed to her passionate commitment to culture (“This is how I am and there’s no changing it”) that had already played an important role in her family when she was growing up.

HARTING as Sponsor of the “Formula Student Electric”

Fielding race cars they have created themselves, students from all around the world compete in suspenseful competitions at the Hockenheimring racetrack – and without using even a single drop of gasoline. This is the “Formula Student Electric” - an event that gives the next generation of engineers a chance to show what they have learned at university. The HARTING Technology Group intensively fosters qualified young engineering students and has supported various racing teams as a sponsor since 2010. Moreover, HARTING also presented a special prize for energy efficiency.

Successful Master's Thesis in the HARTING Laboratory

Close cooperation with research institutions is an important part of a successful R&D strategy for high technology companies like HARTING. This is why the company offers university students a chance to get to know HARTING through internships and thesis work. Advised by project leader Dr. Lutz Tröger, Axel Küttemann drafted his master’s thesis in the company’s own laboratory. He succeeded in replacing the previous manual inspection of the printed conductors on injection-molded circuit carriers (3D-MID) with an automatic test using robots.

We are always available to answer your questions

Do you have any questions, wishes or suggestions? We are always pleased to hear from you:
redaktion@HARTING.com
Current Sensors for Power Electronics

A swift and precise current measurement is needed for the exact regulation of power electronic systems such as frequency converters, switch-mode power supplies, UPS systems and welding systems. HARTING current sensors that have been specially developed for these environments offer a very high level of interference resistance, in addition to highly accurate measurements.

» Tobias Schäfer, Product Manager OEM, Germany, HARTING Technology Group, Tobias.Schaefer@HARTING.com

Power electronics is a key technology in markets like railroad technology and renewable energies, and one of the most significant application fields for HARTING solutions. HARTING is the market leader in electromechanical components and systems for these applications, and is steadily expanding its product range for connector solutions.
measurement principles

In close cooperation with important key customers, HARTING has developed an optimized solution that fulfills the requirements of modern power electronics. The new current sensor product family is based on the proven Hall effect, which measures, in an electrically isolated manner, the current via its magnetic field. Two measurement principles are utilized here: Compensation current sensors (Closed Loop technology) are available for demanding measurement jobs; direct-mapping current sensors (Open Loop technology) can be used if the precision requirements are not as strict.

For open loop sensors, the primary current’s magnetic field is concentrated in a magnetically soft toroid. A Hall element that generates a voltage proportional to the magnetic field or to the current is positioned in the toroid’s air gap. The Hall voltage is amplified and delivers a mapping of the primary current as an output signal. One advantage of these sensors is the simple design. The temperature dependency of the Hall element and the amplification (Offset and gain drift) influence the precision, however.

Closed-loop sensors have a design similar to that of direct sensors. The Hall voltage, however, is not used directly as measurement signal instead it is used to regulate a secondary current. The secondary current flows through a coil with N windings and generates a magnetic compensation field in the toroid. If the secondary current x N is exactly the same as the primary current, the two magnetic fields cancel each other in the toroid. The Hall element always regulates the magnetic flux to zero. The secondary current is simultaneously the sensor’s output signal (I_{sec} = |I_{pri}|/N). These sensors consume more current, but work very precisely throughout the entire temperature range (-40° C to 85° C, accuracy ≤ 1 %).
The Future of Mobility

The requirements placed on E-Mobility are high - after all, electro-cars are expected to take the place of the accustomed combustion engine cars without compromising the convenience. Fielding effective solutions for charging systems, the HARTING Technology Group is contributing to the future of mobility.

» Veit Schröter, Business Development Manager E-Mobility, Germany, HARTING Technology Group, Veit.Schroeter@HARTING.com
Electromobility has featured as a key topic for the general public at least since the IAA International Motor Show 2011. Virtually all established automotive manufacturers are launching electromobiles onto the markets. Numerous new manufacturers are taking advantage of the opportunity to develop their own concepts and product lines that they hope will succeed on the market. This is all in the face of thoroughly positive experiences in the daily operation of E-vehicles.

Today’s electric cars already offer performance compatible with the respective user profiles. A car’s average daily driving distance ranges from 30 to 40 km, and the E-vehicles already offered on the market today feature operating ranges exceeding 100 km. Electromobiles are already offering performance that satisfy the requirements of daily driving.

But developments are not yet complete: Automotive manufacturers see the need for considerable development especially in terms of range and charging time.

Special attention is focused on suitable charging technology and the respective applications, and this is where the HARTING Technology Group enters the picture. HARTING developers are striving to develop compatible components for the charging infrastructure and place them successfully on the market. The priority here is on the highest quality and reliability. The HARTING product range includes charging cables with E-Mobility connector type 2 (according to ISO 62196) in various packaging and performance ratings, type 2 socket outlets, for example with integrated locking system, as well as customer-specific solutions according to requirements specifications.

In order to ensure quality and sustainability, HARTING is devoting special energy particularly to the development of standards and guidelines for electromobility in committees in the NPE, the DEK of DIN and the IEC, and also in cooperation with organizations such as ZVEI, ORGALIME and BDEW.

HARTING customers also appreciate this commitment, as seen in the successful cooperation with RWE and projects with automotive manufacturers such as the Volkswagen Group. The HARTING Technology Group’s broad base and many years of dedication in the automotive supplier sector are important factors in this work. In this context, HARTING Automotive GmbH & Co. KG is certified to the strict ISO/TS 16949 automotive standard.

In meeting the requirements, HARTING is also drawing on the know-how the Group commands in connection and network technology that has proved successful in railway technology. The strategy in electric cars is to create a successful combination of the demands from the widest range of areas: there is virtually no other product where the special demands of automobiles, energy generation, energy supply, network availability and the environment must all be brought into line.

HARTING developers are striving to develop compatible components for the charging infrastructure and to see them succeed on the market.”

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**IN BRIEF**

- Electromobility is attracting a great deal of public attention
- HARTING offers compatible components for the charging infrastructure.
- HARTING is committed to the development of standards and guidelines.
Applications of local subsidiaries

The finale of the 56th Eurovision Song Contest, which was broadcast live from the Esprit Arena in Düsseldorf on May 14, 2011, met the high expectations for the show. A total of 35,000 spectators followed the spectacular finale of the live show. Some 13.83 million viewers watched the Eurovision Song Contest on German television, and around 120 million people around the world followed the event on their televisions. The Düsseldorf soccer stadium was briefly transformed into Europe’s largest television studio for this major event.

The Show goes on with HARTING connectors

90 Movecat chain hoists from Think Abele GmbH & Co. KG helped change the scenes on the stage. The precise raising and lowering of stage backdrops with chain hoists calls for the most advanced and precise motor controllers. HARTING connectors have been designed for direct connection to motors and to the distributed controllers. The robust Han® 16 B connector solutions support the technical requirements with a high degree of protection (IP 65/67). They can also be swiftly and securely inserted, particularly under tight time constraints.

» Thorsten Stuckenborg, Market Manager, Germany, HARTING Technology Group, Thorsten.Stuckenborg@HARTING.com
Reliable High-Tech Starters for Diesel Units

A long service life and great reliability, very high short-term power output at even the lowest temperatures, frequent engine starts, a high number of fast loading cycles and little maintenance cycles: these were the requirements placed on a diesel unit to be used for shunting locomotives in a retrofit program for the Swiss railway. The Swiss railway technology firm Railtec Systems GmbH, known to be a very innovative company, has developed a powerful, resilient starter technology concept based on capacitors. Despite requiring somewhat more space, capacitors are far superior to batteries when it comes to satisfying the requirements mentioned above. When combined with the connectivity solution from HARTING, the result is a system with a high quality level, great reliability and a long service life. IRIS certification (International Railway Industry Standard), technical competence and a broad range of durable HARTING products are the crucial factors that made this connectivity system solution possible.

» Rolf Baumann, Managing Director HARTING AG, Volketswil, HARTING Technology Group, Rolf.Baumann@HARTING.com

Reliability for Clean Rooms

Demanding engineering is called for in the semiconductor industry and in cleanroom technology. The engineering and automation specialist e-concept GmbH in Aachen has established itself as one of the most capable partners in this branch. The HARTING Technology Group has provided efficient connector solutions for e-concept that impress with the highest level of reliability and contactability. The quality of the HARTING products and the option of processing these in a modular approach allow e-concept to provide top quality components for the semiconductor industry sphere.

This results in fully prepared products and components that can be put to direct use in machine construction in the semiconductor industry.

The development of a laboratory system for producing EUV light (Extreme Ultra Violet) for manufacturing chips with extremely small structures is one salient example. Particles only fractions of a micrometer large that are found in normal ambient air can disrupt circuits, necessitating special cleaning for the components. The subsequent packaging in a number of special foils ultimately allows particle-free processing in the cleanroom.

» Guido Selhorst, Head of Market Management, Germany, HARTING Technology Group, Guido.Selhorst@HARTING.com

Thomas Schmidt, Chief executive officer e-concept GmbH, Germany
Dear Readers,

We are very interested in your opinion, and we would like our tec.News to reflect your ideas and wishes as closely as possible. Your suggestions will help us make tec.News even better, and of course we would also love to hear your praise. Our objective is to keep you informed of the news and applications at HARTING – and in the very best way possible.

Please do give us a few minutes of your time and take part in our online survey. You have until July 31, 2012 to participate. To show our appreciation for your efforts, one lucky participant will win an Apple iPad. It pays to join in!

Thank you very much for your support.

Your
tec.News editorial team

This link will take you directly to the reader survey:
www.HARTING.com/tecNews-survey
## HARTING Trade Show Calendar

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<td>Russia, Moscow</td>
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