



TIME TO ANSWER THE CALL.

FUTURE TECHNOLOGIES

THE NEXT GENERATION

Dear readers,

The future is not lying just ahead of us – it is already upon us! In the last issue of our technology magazine tec.news, we looked at the megatrends at large in our society as a medium through which to sharpen our perspective on connectivity. As you will see in this issue, these trends continue to play an important role for us. In particular, we are keen to embrace the issues of sustainability, demographic change and (de-)globalization and

explore the associated technological aspects that will in future be of primary relevance to us. Dr. Kurt D. Bettenhausen, our new board member for New Technologies and Development, will be responsible for the content of our technology magazine from now on. At this point I would like to hand over to him, and wish you much pleasure in reading the latest issue of our tec.news.

With best wishes,

Philip Harting

Philip Harting,
Chairman of the Board



Dear Readers,

From the moment you open this issue, you will notice the difference ... our tec.news has changed! The focus of this issue is on the future-oriented topics of “Transportation” and “Industrial Communication” which in turn derive from the megatrends we have previously looked at. They form a common thread running through the newly designed sections of our magazine: We start with a strategic editorial before handing over to our guest authors who will address these issues under the banner of “Future Trends” and shed their own particular light on them. The “Future

Technologies” section elaborates the ways in which these trends are even now being taken up and forms the basis for “Collaboration & Co-Creation” – the section in which we present projects that we have implemented together with our partners. And to wrap things up, you will find the usual overview of our problem-solving solutions under the heading of “Customer Benefits”. Share our excitement, let our new tec.news inspire you, and do let me know how you like this new format and especially the content!

Yours, Kurt

Dr. Kurt D. Bettenhausen,
Board Member for New Technologies and Development





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We all experience it each and every day: our world is in a phase of fundamental change! It can be helpful to divide this phase into so-called “megatrends” to assist us in describing, understanding, analysing – as well as actively shaping – this transformation. Given the velocity with which this change is occurring, these megatrends do not merely describe some distant scenario that will unfold over our medium- or long-term future.

On the contrary, the trends have already found their way into our day-to-day doings and represent far-reaching, global societal issues that will accompany and shape our lives for decades to come. “Megatrends” is a well-established term that has provided the impetus for numerous research and development projects. For example, the Zukunftsinstitut (the Future Institute), a research organisation founded in 1998 and one of the most influential think tanks in European trend and future research, has identified 12 megatrends it calls “deep currents of change” (see <https://www.zukunftsinstitut.de/dossier/megatrends/>) and that have far-reaching consequences at all levels of society for business and politics, as well as science, technology and culture.

At HARTING, we focus primarily on the megatrends “Sustainability”, “Demographic change” and “(De-) Globalisation”, which are of central importance for our Technology Group.

SUSTAINABILITY:

Together with environmental protection and climate change, sustainability has not only grown into an important economic factor, but has become a global challenge for society, culture and politics. The use of renewable raw materials, recyclability, and resource protection are of central importance for HARTING. In a word, there will be no future worth living without sustainable economic activity!

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“Demographic change”
and “(De-) Globalisation”.***

DEMOGRAPHIC CHANGE:

Changes in society’s age makeup – brought about by an ageing population due to declining birth rates and increasing life expectancy – present a multitude of challenges to nations, the economy and society. In specific terms, for the world of work this translates into a growing shortage of skilled workers and an inexorable rise in the need for them. Consequently, we face the following challenge: how can smart technologies assume tasks that we humans are neither well-suited for, nor interested in?

At the same time, demographic change offers great opportunities. An active and individual lifestyle is possible right into old age. How can we support this?

Megatrends Society:

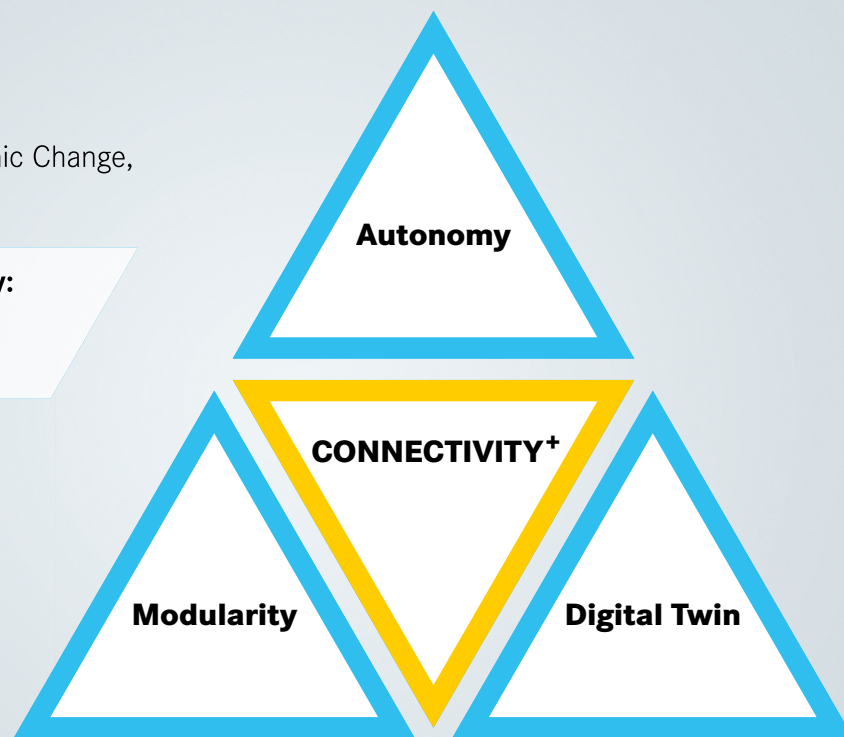
Sustainability, Demographic Change,
(De)globalisation

Megatrends Technology:

Modularity, Autonomy,
Digital Twin

Future Connectivity:

DC Industry, E-Mobility,
Single Pair Ethernet (SPE)

**(DE-) GLOBALISATION:**

The world economy continues to undergo fundamental shifts. This was made all too clear this past year, which was marked by a global pandemic. Global trade in goods is shrinking, supply chains have been interrupted, and the consequences for export-dependent countries have been serious. A crisis of global proportions has raised awareness of the vulnerability of globalisation. The growth area of technology is becoming increasingly important and it is crucial to keep abreast of developments with regard to digitisation and automation. Regardless of whatever scenario we consider to be likely going forward, what remains important is finding the right balance between local and global value creation for the respective company and the respective industry – especially against the background of the demands that sustainable economic activity entails!

TECHNOLOGICAL MEGATRENDS

Technological megatrends can be deduced from these social megatrends and their associated challenges. Here, we primarily see “Modularisation”, “Autonomy” and “Digital Twin”. The connectivity of the future is THE element that ties things together, and is the fundamental “enabler” of these technological megatrends. As such, it is becoming a technological megatrend in and of itself. At HARTING, we’re shaping this connectivity of the future and refer to it as “CONNECTIVITY+”.

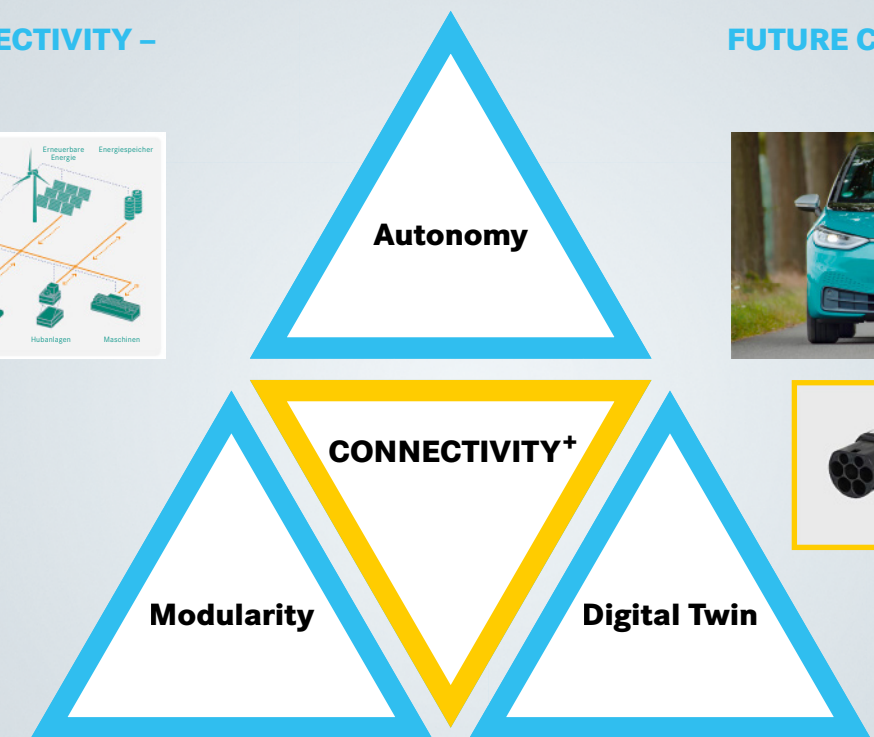
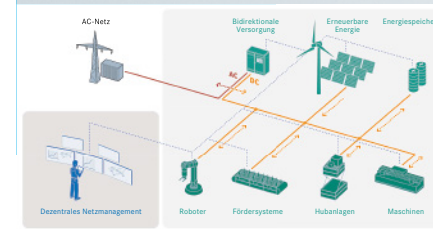
For HARTING, the main topics with respect to application are electromobility, DC power supply in the industrial sector, and new,

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pioneering ecosystems in the field of industrial communication, e.g. Single Pair Ethernet (SPE).

As part of the DC INDUSTRY research project, HARTING has teamed with 40 industrial partners to focus on developing a future direct-current infrastructure. Together, we’ve set ourselves the goal of revolutionising industrial power supply and are looking to take it to a new level. By developing the appropriate connectivity, we will enable users to save energy and thus directly save on energy costs. This is what socially responsible action and a concrete contribution to climate protection and sustainability look like.

The work of the SPE Industrial Partner Network, to which we belong, focuses on an end-to-end SPE ecosystem – from the sensor to the Cloud. Our mutual goal for the future is to provide a high-per-

**FUTURE CONNECTIVITY –
DC INDUSTRY****FUTURE CONNECTIVITY –
E-MOBILITY**

formance infrastructure for digitisation in the industrial sector. Looking at the value chain of the energy infrastructure, there

***Our mutual goal for the future
is to provide a high-performance
infrastructure for digitisation
in the industrial sector.***

are two points of contact at HARTING. On the one hand, we are pioneers when it comes to reliable, clean and environmentally-friendly electromobility. Our area of activity is rounded out by customised solutions and components for all relevant sales areas, as well as the development and manufacture of charging infrastructure solutions for electric and plug-in hybrid vehicles. On the other hand, we are also targeting the current requirements for the optimal mobile – as well as stationary – deployment of decentralised energy storage.

Looking at the field of rail technology, we can already fall back on years of expertise in this market. Strictly speaking, our HARTING connectors are already ‘living’ electromobility in this segment. This commercial area will also gain momentum going forward – we’re using new technologies to create optimal data communi-

cation while working overtime to make high currents and voltages plug & play-ready while boasting minimal weight. However, before we go into more specific detail on our solutions for this area (pg. 32-39), let’s delve more thoroughly into the future trend of “Transportation” in this issue. Read also our interview with Roland Edel, Chief Technology Officer at Siemens Mobility. ■

Dr. Kurt D. Bettenhausen,
Board Member for New Technologies and Development,
HARTING Technology Group,
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ARE WE FIT FOR THE FUTURE IN GERMANY?



Will Germany succeed in taking the major leap towards digitalisation? Industry is already leading the way in many sectors and naturally, a lot is happening on all levels at the moment – not least driven by the Corona pandemic. But what kind of leap will administration, healthcare and education still have to take here? And what will each of us – as citizens, patients, pupils or teachers – gain from the digitalisation initiatives?

Wilfried Bauer, Head of the Public & Health Business Area at the Telekom subsidiary T-Systems, is convinced: “We no longer have time for trial and error. It is now a matter of making all public sectors fit for our digital today and tomorrow with quick and clever solutions.”

After three years, even a calamity may be of some use, as a Far Eastern adage goes. And probably the same will be said of the ongoing pandemic crisis that is currently impacting the world, our lives and our economy to such a great extent. After all, it is now becoming patently clear to everyone: Digitalisation is the only way forward. Because virtually daily the current situation is staring us in the face, confronting us with the fact that we in Germany are often still far too slow, far too cumbersome.

Digitalisation of schools? Networking of the health authorities? A consistently designed vaccination management system? Even after months of crisis, this has still not been achieved in many cases.

The current situation shows how important digital processes are for both companies and public administration. This starts with



Those who had already digitalised their processes, at least partially, were able to continue working – also during far-reaching contact restrictions.

the digital workplace and continues with all business processes. Those who had already digitalised their processes, at least partially, were able to continue working – also during far-reaching contact restrictions. Whether e-commerce, digital doctor's appointments, administrative or banking transactions, video chats with customers or internal processes: digital processes are always available, faster and save time and costs.

PUBLIC-PRIVATE PARTNERSHIPS - A QUESTION OF TRUST

As the development of the Corona warning app has shown: a lot can be done and it can be done in a short period of time if there is an urgent need. Even in public-private partnerships. In just 50 days, Deutsche Telekom, together with its long-standing partner SAP, set up the warning app on behalf of the German government. With currently 25 million users, it is by far the most widely used app of its kind worldwide and is undergoing continuous further development. Right from the very outset, we decided to put the issues of voluntary use and data protection at the forefront – and the great acceptance of this concept proves the validity of these considerations to this day.

T-Systems and Deutsche Telekom serve almost all government agencies in Germany and many in Europe, as well as various regional state authorities, administrations and other public institutions. Here, too, the focus is on trustworthy han-

dling of highly sensitive citizen data. We need a sovereign cloud infrastructure for Germany that enables even more convenient and, above all, secure online services for citizens. For example, the “Dialogised Housing Allowance Procedure”, which offers a completely software-based solution for the processing and payment of housing allowances for both federal states and municipalities.

Or take the area of broadband and 5G expansion: here, the digitalisation of the so-called securing of routes, which is used to manage 1.5 million permit applications for cable and line laying, can ensure a significant acceleration of the processes. So that Germany can finally move up from one of the lower ranks in the EU Digitisation Atlas to one of the top places.

MORE IMPORTANT THAN EVER: PARTICIPATION IN DIGITAL EDUCATION

The fact that Germany is lagging behind becomes apparent at the latest when schools have to shut down due to high infection rates. In these scenarios, almost 11 million pupils and their parents are faced with the challenge of “home schooling”. Neither the equipment at home nor the equipment and facilities in schools are even remotely prepared for this – it comes as no surprise that, according to an OECD study, Germany is only ranking at 13th place internationally in terms of digital education. And not just since the Corona pandemic.

Teachers are not only complaining about the lack of equipment, however, but also about the lack of professional support for maintenance and operation of the IT tools and equipment. The market is fragmented and full of providers for various isolated solutions. What is called for here, however, is a player that can offer a comprehensive, holistic range of services, from networking and secure platforms through to service and operation – a complete ecosystem for digital education, so to speak. This is where Telekom bundles all of the group's resources in order to live up to its social claim of being “#there” (“#dabei”), namely to take everyone along with them on the course to digital society.

Modern, digital education is a central building block for the future capabilities and viability of our country. Children must be introduced to digitalisation and its possibilities as early and as quickly as possible. Blackboards and chalk are simply no longer in line with the times. What is needed here is a genuine “mind shift”, also among teachers and school authorities, who perceived digital teaching not as an additional expense but as genuine added value for modern teaching and learning – also after the pandemic.

GETTING CLOSER TO PATIENTS

The accusation that digitalisation will alienate people from each other over the long term is a recurring one. In the health sector in particular, it is clear that precisely the opposite is the case. So-called home care solutions, telemedicine or digital health tools that monitor diabetes, heart functions or other vital signs and transmit them in real time bring patients and doctors closer together – independent of time and place.

However, it is far more than just doctor-patient relationships. Digitalisation simplifies and streamlines all processes in an increasingly complex healthcare system, in which the most diverse protagonists and systems must grow together and interact ever more closely. The essential building blocks for the digital transformation of healthcare are as follows: secure networks, data protection-compliant use of information, digital applications and cross-sector connectivity. According to a Gartner study from last year, the CIOs of large hospitals and other healthcare institutions are consequently planning to invest massively in data analysis, IT security, user experience and process automation.

Unfortunately, Germany is currently playing at the bottom of the league in this area as well. Spain, Denmark and above all Israel are miles ahead of us. This is also currently evident in vaccination management. Together with SAP, Telekom has just developed a completely digital vaccination process chain: From the scheduling of appointments, to the comparison with the registration register, to the control of mobile vaccination teams, to the distribution of the vaccine in stock to the respective vaccination centres. This solution shows on a daily basis who is in the age group entitled to vaccination, how much vaccine is available where, and how individual appointments can be made accordingly.

In 2021, more than nine out of ten companies are aiming to change their long-term IT strategy.

In 2021, more than nine out of ten companies are aiming to change their long-term IT strategy, and this also applies to the three areas discussed – in view of the current situation. Regardless of what the front end looks like, without the shift to a secure cloud infrastructure (keyword Gaia x) and away from proprietary solutions, large-scale digitalisation will not work. So the shift to the cloud will be driven forward with even stronger dynamics greater and more money will flow into automation and the real-time analysis of data (Big Data). These are investments that are decidedly worthwhile – delivering significant cost savings thanks reduced administrative input and efforts on the provider side and more and simpler services for users, in other words, for all of us. ■

Wilfried Bauer,
VP Business Area Public & Health
at T-Systems

GREAT ADVANCES ENCOUNTER GREAT CHALLENGES

What role do transportation and mobility play with regard to social and technological megatrends? In an interview with tec.news, **Roland Edel, Chief Technology Officer of Siemens Mobility GmbH**, took stock of his thoughts and visions for the future.

tec.news: What is your view of the significance of mobility and transportation as important future trends?

R. Edel: Growing urbanisation is an important future trend. More and more people are living in urban conurbations at the same time as global trade in goods is increasing in non-stop fashion. Consequently, transportation systems will always be important in the future. Yes, there have been certain cutbacks due to the pandemic, but this will level off again as soon as we return to normality once Covid-19 is over. The pandemic has definitely had a significant impact on “business tourism”. Last year in particular made it clear that not every business trip or trade fair is necessary. Given this, I think we won’t see the increase in transport needs in this area that we previously witnessed.

tec.news: Where and how do you assess different regional needs?

R. Edel: Here, I like to talk about Maslow's hierarchy of needs in the transportation sector. To take some prominent examples, Berlin and Vienna are well-equipped in terms of local public transport, and as such they solve completely different problems, than a small town in South America does, for example. The situation in other metropolises, for example in China, is that they have yet to build up public transport at all. For me, the difference is not so much in the regions, but rather in the question of ‘where are individual urban centres or individual nation states at in terms of their public transport systems’. For example, the European Union, Japan, Canada and parts of the USA are well developed in this regard. For them, the question that arises is more along the lines of how can we optimise their systems even further?

Here, I like to talk about Maslow's hierarchy of needs.

How do we make them more attractive to passengers? How do we get more traffic to switch from private to public transportation? The big difference here is in comparison to other regions that have yet to build their infrastructure – for example because their public transportation only offers bus systems and they urgently need a subway. But even in Germany there’s no homogeneous picture, you’ve got cities that are thinking about trams



We need to scale up sustainable solutions significantly faster.

Roland Edel, Chief Technology Officer
Siemens Mobility GmbH

while in other places all the existing systems are already networked.

tec.news: Which technological megatrends do you view as emanating from which social megatrends? For companies, what does this mean specifically?

R. Edel: In addition to the trends of urbanisation and global trade I went into earlier, there is also climate change. These cited trends require sustainable mobility systems. In turn, in order to be able to create sustainable mobility systems, we need a shift in traffic

In order to be able to create sustainable mobility systems, we need a shift in traffic from private transportation to public transportation.

from private transportation – where a relatively large number of resources are wasted per person or per tonne-kilometre – to public transportation.

Basically, more options are needed in order for public transportation to be used in the first place. On the one hand, this can be achieved by upgrading things, via new construction or expansion. On the other hand, you can increase efficiency by digitising mobility. Numerous ongoing digitisation efforts are enabling us to build systems more efficiently and to push more traffic through pre-existing systems. Digitisation is the main lever with which we can increase the efficiency of existing infrastructures. It's also important to increase the user-attractiveness of systems in line with the concept of "Mobility as a Service", both as a freight user as well as in passenger transportation.

Another trend I see is the need for cities themselves to become smarter. Living environments must be created with intelligent water and power supplies as well as intelligent transportation. How can we build or convert cities in the future in a way that permits them to be controlled? Naturally, the area of cyber-security is an important factor here, because without it a smart city could be completely paralysed. So you've got to have the associated resilience, which is something that's also important for rail, road and all digital technologies.

Still, in my opinion the subject of "service" in connection with digitisation technologies is also an important point, because the latter help ensure that as little maintenance as possible is required with as much infrastructure as possible. Sensor technology

and/or artificial intelligence help to create intelligent maintenance systems that ultimately provide information on what needs to be done and when. Adjustments and updates then increase efficiency as time goes by. As soon as you digitise a service you end up with more services that are continuously evolving. For example, there are tens of thousands of point machines in Germany. Digitally retrofitting them enables us to display their current strength and/or the power needed to push the switch. If this becomes increasingly difficult over time, on-site maintenance ultimately becomes necessary, and we can precisely determine the point in time at which to perform this maintenance.

tec.news: Looking back 10 years, what do you think are the greatest advances that have been made to date?

R. Edel: There's no doubt that the topic of sustainability can definitely be cited as the greatest advance in the last 10 years. I mean, today the question is no longer whether we want to become sustainable, but rather how we want to achieve it? Back about 30 years ago environmental protection wasn't relevant at all in our area. We took another big step when digitisation took off. Thanks to digitisation, we've already cemented digitised train control systems in place and we are achieving higher throughputs, shorter intervals between trains, efficient maintenance processes, etc. But the journey's only begun. Of course, this is all a great step forward, but at the same time it's a huge challenge.

tec.news: Looking towards the future, what will be particularly important over the next few years? Where do you see potential obstacles?

R. Edel: We need to continue to go down the path of automation with digital technology and make further progress in terms of autonomisation. This will be an exciting challenge especially in the area of private and public transportation. When he was asked when cars will become autonomous and really be driverless, the head developer of US technology company Waymo replied 'If the weather is nice and on good roads, we're already there today, in 30 years it will be on every street and in every kind of weather'. I think it'll be similar for the rail sector, even though we're already on the right track. For example, there are already driverless subways, e.g. in Nuremberg. But the safety protocols used there can't just be transferred willy-nilly to trams or regional and high-speed trains. In the future you'll need environment sensors that make the vehicle so intelligent that they can replace the driver. In addition, a system like that will also need to be supported at critical points by the infrastructure, e.g. by lighting systems at an intersection or things like that. Today's train protection systems prevent collisions by using other tracks but still haven't been designed to recognise people or animals on their route. It will probably be a few years before every train can be used completely autonomously, whatever the environmental conditions, and on any route.

Another important point is that we have to scale sustainability solutions much faster over the next few years. To do so they have to be inexpensive and reliable from an industrial perspective. From a national regulatory perspective, the question is how do we control this scaling? In turn, from the user's point of view, the key role is the issue of acceptance.

We also need to enhance the passenger experience in our public transportation options. The railroad has focused on being a means of mass transport since the 1950s. Over the decades, this has also resulted in passengers opting for private solutions, e.g. using a car.

Nowadays, public transport still means changing trains, or first arriving at some place from which your (continued) transportation takes place. This works door-to-door in private transportation (cars). Consequently, our goal is to be sustainably attractive for operators and passengers, e.g. via our Mobility as a Service – or “On Demand” solutions (DRT) in the future. These enable the passenger to plan and optimise his route in advance as well as integrate other means of transportation such as bicycles. “On demand” mobility solutions could in turn be self-driving minibuses, which are currently being used in the “Heat” project in Hamburg.

Consequently, our goal is to be sustainably attractive for operators and passengers, e.g. via our Mobility as a Service – or “On Demand” solutions (DRT) in the future.

tec.news: In your opinion, what are the three most important tasks for the sustainable development of mobility and transportation in the next 3-5 years?

R. Edel: In the near future, the main task will be in three big areas: avoidance, shifting, and improvement. What do I mean by this? Transportation should be avoided where possible. Consequently, we need further optimisation of logistics such as avoiding empty runs, quickly switching goods between modes of transport, etc. If something can't be avoided, it should be shifted to a mode of transport that makes the most sense in terms of a sustainability rationale, efficiency and energy concerns. If it can't be shifted like this, the respective transportation mode must be improved by making it as efficient and sustainable as possible while achieving high throughput.

We have to increase the efficiency of the railways through digitisation, and increase capacities. With regard to e-mobility on roads where we use electric energy directly in the form of batteries and/or overhead lines, we need to achieve a massive improvement over the next few years. After all, by 2030 we want to ensure that combustion vehicles are no longer allowed to be registered unless they're no longer powered by fossil fuels. This is going to be a major task that needs to be tackled today. We need solutions here, maybe based on hydrogen or e-fuel? Or maybe a smart combination of everything? ■

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Dr. Oliver Kleineberg, Hirschmann, in an interview

SPE – CHANCE OR CHALLENGE FOR AUTOMATORS?

HIRSCHMANN
A BELDEN BRAND



INDUSTRIAL
PARTNER
NETWORK



Dr. Oliver Kleineberg,
Global CTO Core Networking
at Hirschmann Automation and
Control GmbH

tec.news: Mr. Kleineberg, do you view SPE in industrial automation more as an opportunity or as a challenge? And, in your opinion, what barriers are currently still in place at automation companies in terms of SPE device integration?

Dr. O. Kleineberg: SPE represents a huge opportunity for industrial automation technology. The challenge is to actually make good on these opportunities and advantages. For SPE to gain a broad foothold, the benefits have to be tangible and measurable. This can only happen if an end-to-end ecosystem is available for SPE to which users can rationally migrate

and which can be fully integrated into existing automation systems. Adopting it in patchwork-quilt fashion, i.e., SPE in only a few places, would quickly see the benefits become so negligible that a switch to SPE would ultimately no longer be worth it. So the key is a complete ecosystem of connectors, cables, IO systems and active network components. Availability of the required silicon components such as PHY modules is an additional challenge, especially for active devices.



tec.news: What possibilities does SPE offer automation that weren't possible with previous infrastructure? What role do higher data rates and the simultaneous transmission of power via PoDL play?

Dr. O. Kleineberg: SPE is an essential building block for the complete implementation of modern automation systems. The high bandwidth that SPE provides all the way down to end devices at the field level is a basic precondition for further new steps in value creation, e.g., predictive maintenance or process optimisation. SPE is the only way that collected raw data can

SPE is an essential building block for the complete implementation of modern automation systems.

sensibly be transmitted from the field level to higher-level computing systems and to the Cloud for the additional processing that's required. The increased bandwidth and new functionality of Power over Data Line (PoDL) not only make it possible to increase the number of sensors at the field level but sensors with significantly expanded functionality will also become a reality, allowing information fusion from different sources, such as a LIDAR and optical detection systems.

tec.news: In your opinion, is SPE the long-awaited building block for the implementation of IIoT via digitisation of the field level, which serves concepts such as machine learning and predictive maintenance?

Dr. O. Kleineberg: The data volumes that arise can only be moved sensibly and practically to the points in the automation system where they're needed via Ethernet and SPE and other supporting technologies such as Time-Sensitive Networking (TSN).

tec.news: Will Hirschmann be showing the first application solutions featuring SPE components in 2021?

Dr. O. Kleineberg: Hirschmann and Belden will be unveiling both active and passive devices and components with SPE in 2021.

tec.news: What motivated you to join the SPE Industrial Partner Network at such an early stage and ramp up your activities?

Dr. O. Kleineberg: We've been following and supporting Single Pair Ethernet technology for many years, as evidenced by the fact that we were there during the initial steps of IEEE 802.3 standardisation, for example. We joined and support the SPE Partner Network because we'd like to help ensure that a complete ecosystem of different SPE products interoperable between all manufacturers will become available to the industrial sector and to our customers, of course, so that they can avail themselves of the advantages of SPE as quickly and expediently as possible. ■



WIPANO

COPPER

AN OUTDATED TECHNOLOGY OR POWER BASIS FOR THE IIOT?

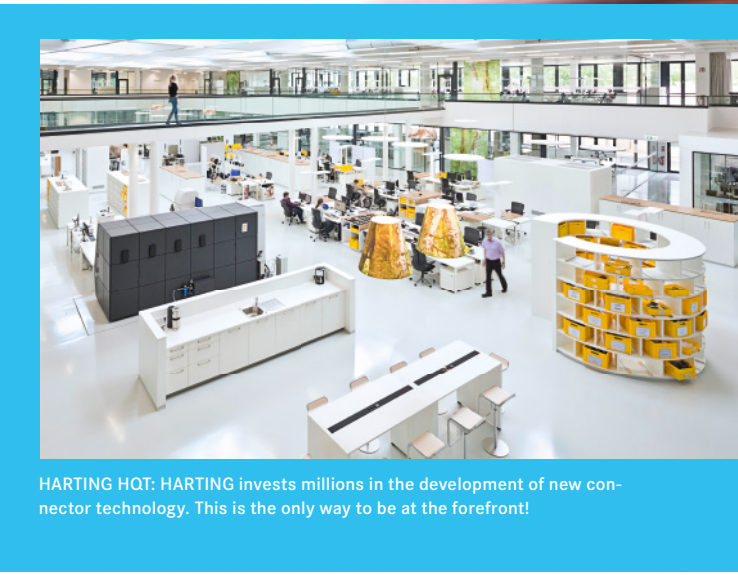
Are copper-based conductors an outdated technology or are they the basis for IIoT and emerging Ethernet networks? Reutlingen University's NG200 joint project with HARTING and LEONI explored this question with the aim of demonstrating how well-known and relatively new copper-based transmission solutions compare to WLAN and fibre optic cables. In this context, the focus was on possible data transmission bandwidths with simultaneous power supply, depending on the transmission path.

Rainer Schmidt,
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Powerful data and information networks comprise a basic requirement for the requisite development steps in automation technology and for Industry 4.0 and IIoT. The NG200 joint project of Reutlingen University, in cooperation with HARTING and LEONI, demonstrates just how much power copper-bound communication technology holds in store.

As far as communication standards go, the beneficiaries are TCP/IP and Ethernet. For a long time, wireless technologies such as Wi-Fi/WLAN or 5G were favourites in the battle of available communication media. With the advent of Single Pair Ethernet (SPE), the balance of power is shifting substantially once again.

The research was intended to explore the performance limits of copper-wired networks – both for de facto communication in terms of bandwidth in MHz or data transmission capacity in Gbit/s and the coding used, such as PAM16, as well as the simultaneous transmission of supply voltages for end devices. The simultaneous transmission of power and data via Power over Ethernet (PoE) or Power over Data Line (PoDL) are well-known, and the ability to employ remote power supply represents a lasting advantage over wireless and fibre optic transmission.



HARTING HQ: HARTING invests millions in the development of new connector technology. This is the only way to be at the forefront!

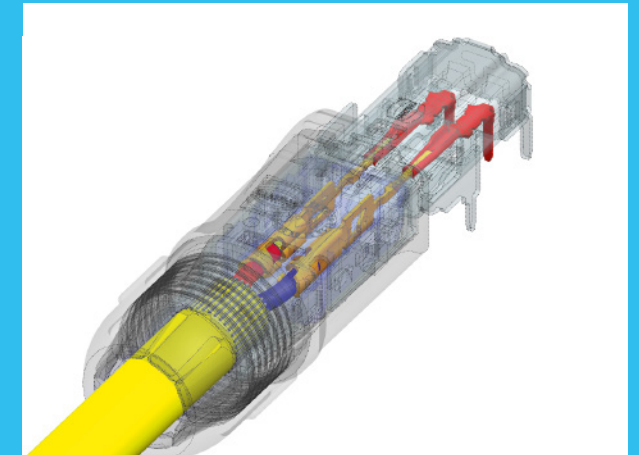
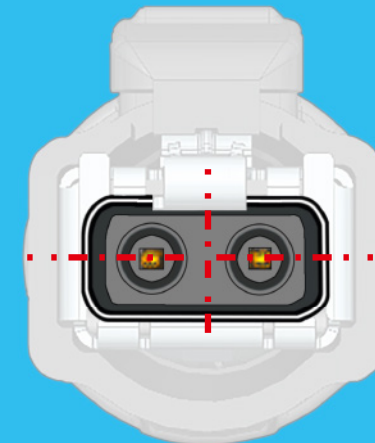
Specifically, channel models were developed and examined that included all transmission parameters depending on bandwidth (frequency up to 2.5 GHz), transmission reliability (BER of 10⁻¹²), the channel length (10-1,000m), the number of pairs in such a channel (here, the smallest unit is a pair = a “twisted pair”/1TP) and the possible power for remote supply (up to 100W).

*With the advent of
Single Pair Ethernet (SPE),
the balance of power is shifting
substantially once again.*

The channel models are matrices that can comprehensively describe channel properties by way of mathematical parameters – S-parameters in Touchstone format. This in turn permits simulations of channel behaviour to be run. The simulation results help to minimise the significant effort involved in developing and manufacturing prototypes for cables and connectors and the subsequent tests in the laboratory.



HARTING T1 SPE connector according to IEC63171-6



High symmetry of the HARTING T1 to ensure 2.5GHz

The investigations were then completed by calculations and tests with power transmissions of up to 100W and the associated cable heating. The results predicted via channel simulation were largely confirmed in the practical tests. The results of the investigations were summarised in a so-called “NG 200 matrix” and show the correlation between bandwidth, range, line coding and transmission rate for a given cable design and a given number of pairs.

This turns the NG200 matrix into a dynamic database that can be harnessed to calculate, evaluate or predict any application.

Expanding the NG200 matrix with the symbol error rate also enables conclusions to be drawn about the best coding method (PAM) to be used.

Conclusion: In future, the NG 200 matrix that is created can be used to quickly and reliably predict necessary cabling parameters depending on the bandwidth, length and the coding method employed. This is particularly helpful when developing more powerful Ethernet components and the associated cables and connectors.

In the future, cable and connector designs up to 2.5 GHz should be examined more closely to discover their technical possibilities and approach a desired cost/benefit ratio. A good example is the HARTING T1 SPE connector according to IEC63171-6, which already has specifications up to 2GHz and is tested.

In addition to the NG200 matrix, the joint project also yielded practical findings that relate to the performance of data cables and connectors. With the technological means available today, the production of data cables and connectors up to 2.5GHz is possible. And if there is a corresponding demand in the market, it can also be shown to be cost-effective. Again, by way of comparison: Today, for a 4-pair system, there are Cat.7A cables (1000MHz) and correspondingly powerful connectors, e.g. ac-

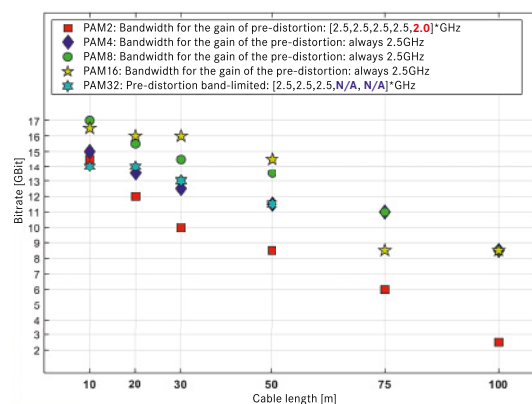
cording to IEC 61076-3-104 Tera™ (the RJ45 can no longer be used for this high frequency range). The key to success with these product designs is the special paired shielding. There is PiMF construction (Pair in Metal Foil) for the Cat.7A cable and chamber shielding for the Tera™.

Consequently, a well-shielded 1-pair system set up in a highly symmetrical manner can be operated with more than twice the bandwidth used today. These 1-pair systems are operated using Single Pair Ethernet (SPE) and are in part already available on the market – see the T1 Industrial from HARTING.

The result is a performance boost by a factor of 2.5 of high-speed transmission via shielded copper-bound systems! Combined with 100% availability and remote power supply for devices, copper technology is not outdated at all, but rather a declaration of war on fibre optic cable and wireless in the LAN area – as well as a basis for IIoT! ■

Simulation

Bit rate for PAM2-PAM32 over cable length (single-pair cable). Pre-distortion over entire cable spectrum with limitation of pre-distortion gain to max. 2.5GHz



Valuable notes

- The results of the joint project and the NG200 matrix will be incorporated into international standardisation. Consequently, preparatory work is under way on a standard proposal (NWIP/TS) for modelling information technology transmission channels for ISO/IEC JTC 1/SC 25/WG 3.
- ISO/IEC JTC 1/SC 25/WG 3 is the body that developed the ISO/IEC 11801 series (structured cabling) and, with the amendment of ISO/IEC 11801-3, was the first to present a comprehensive cabling standard for SPE cabling in the industrial sector.
- The detailed final report for the NG200 joint project is available in the TIB (Technical Information Library) under the research number 03FS15010.

HIGHER SAFETY LEVELS & LONGER SERVICE LIFE THANKS TO TARGETED REDUCTION OF INTERFACE COMPLEXITY

How can high-current interfaces for the exterior of rail vehicles be designed so that they are convenient and simple to install, durable and easy to maintain? To meet these requirements, HARTING has developed new high-current interfaces based on the High Pressure Railway (HPR) standard. The result is the VarioShell, TrainPowerLine and High Performance Transformer Connector (HPTC) products. They impress with their robustness, reduced complexity and improved interoperability. Given that simpler installation processes increase power supply reliability while offering considerable savings potentials, the new solutions are also recommended for use beyond the railway sector.

HAN® HPR: DEVELOPING THE RELIABLE

Requests from manufacturers for connectors for power supply above 4 kV in the underfloor area, the train car transition and the secondary-side connection of transformers were the starting points for development work. With regard to the transformer connection, previous solutions relied on housings made of plastic, which can lead to durability of only a few years under the harsh conditions on the

roof of the rail vehicle. Here, HARTING has devised an entirely new pluggable and durable solution with the High Performance Transformer Connector (400, 850 or 1400 A). Thanks to housings according to the HPR standard, significantly longer service lives are achieved compared to plastic housings.

TRAINPOWERLINE: EASY INSTALLATION, EXTENDED SERVICE LIFE

For cable-based power supply in the underfloor area, the industry standard UIC 552 been in place for decades and comprises a number of different connector types to date. The input and effort re-

quired for the installation, including hard wiring at the carriage transition, is considerable. The current processes take up valuable working time in their final completion. The new HARTING solution reduces such efforts thanks to pre-assembly. The TPL is entirely prefabricated and ready for use, only the single poles, with which the underfloor cables are equipped, still have to be crimped on the train. The complexity of the supply structure decreases as only two instead of five connector variants are required. At the same time, the number of components used is likewise reduced, components weight is lower, while handling becomes easier. The simpler the interface assembly, the safer the execution. Fault patterns disappear, the service life rises. Simpler solutions are more future-proof and sustainable.*

VARIOSHELL: MAXIMUM FREEDOM FOR INTERFACE DESIGN

Connections between rail vehicles are implemented as jumper cables. HARTING has developed the VarioShell as a flexible housing consisting of two parts that can be separated. This creates an open system that both simplifies assembly, while also allowing quick access for maintenance and repair (by opening the cover).

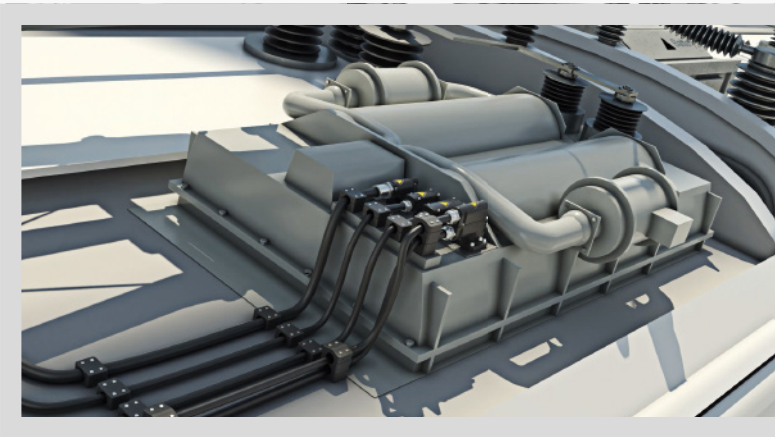
The VarioShell provides developers with maximum degrees of freedom. It provides a fixed framework that can be filled with a variety of interfaces as required. A virtually infinite reservoir of contacts and insulating bodies (monoblocks, modular connectors) is available in the HARTING portfolio for this purpose. Thanks to this flexibility, the VarioShell is becoming the new standard for jumper wiring, significantly reducing the total number of interfaces in the rail-car coupling area.

CROSS-SECTOR SOLUTIONS

All three HARTING solutions combine quality and durability with simple design and convenient, simple installation. And above all, they are decidedly user-friendly, providing consistent and reliable processes during assembly, installation and maintenance. In most instances, the number of parts to be stocked is reduced, thereby lowering costs. Product safety is also enhanced, given the fact that fixed wiring is no longer required. Moreover, simple, repeatable processes also eliminate typical error patterns. ■

Due to their simplicity and durability, the new solutions can also optimally meet the demands for interfaces ensuring a secure supply of data, power and signals over and beyond the railway market. Comparable requirement scenarios exist, for example, in the maritime technology, tunnelling and open-cast mining markets. With regard to the maritime market, the Han® HPR housings offer the advantage that their use is already DNV/GL certified. Thanks to the housing technology, all requirements for a safe use of the power interfaces at sea are therefore fulfilled.

Existing interfaces for inter-car connection involved a variety of forms according to the supply requirements of the respective application and are placed at the most convenient location. The VarioShell bundles these jumper transitions: In future, developers will only have to determine the number of cables required between vehicles and the scope of their services. This in turn results in the number of VarioShells required. The housings only have to be distributed over the wagon wall according to their function.



Han® HTCP

Denny Hellige, Product Manager
Installation Technology, HARTING
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* In order to maintain flexibility, it is necessary to opt for interfaces to the UIC 552 area at the beginning and end of the train unit.

TRUST IS GOOD, MEASUREMENT IS BETTER

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Softing WireXPert 4500
Infrastructure Certified (ISO/EN)



A reliable network connection is indispensable in industrial applications. Ethernet with transmission rates in the Gbit range is entering in to more and more applications at the field level. In order to test the performance of field-terminated connections, Softing IT Networks provides the appropriate measurement technology. To ensure they always have the right connection for standard industrial interfaces, Softing relies on HARTING solutions such as the preLink® system, the ix Industrial® and the standardized SPE interface T1 Industrial. Here's the story of our successful cooperation.

The data rates in current factory automation networks are constantly on the rise and with them the requirements for shielding of cables and interfaces. In this context, standardization already provides good guidelines, which are followed by current manufacturers, while the installation of new infrastructure in the field also holds certain potential for error. Depending on the application, pollutants such as dust or liquids can impact on plug connections and electromagnetic interference may also be responsible for performance losses. When cables are bent too much, pulled over a sharp edge or fail to make proper contact in the connector, performance suffers. Softing IT Networks offers the

appropriate test equipment to effectively check data lines after their installation. The certification test is the most common test method, providing qualitative informa-

The installation of new infrastructure in the field also holds certain potential for error.

tion about transmission quality at LF-Low frequency and RF – Radio frequency. The WireXpert 500 and 4500 are the suitable test devices from Softing's product range.

Measurements with a certifier (also known as a CAT tester or cable tester) after cabling installation, but also after moves, additions and changes to the cabling are a proven way to ensure that the cabling actually meets the performance requirements for a particular application. Test reports from these measurements serve as evidence of the quality of the installed cabling for the installer or systems engineer, as well as the inspectors, users and owners of this cabling. In addition, measurements with a certifier help to drastically reduce downtime due to damage to the wiring, as this damage can usually be found much faster with a certifier than by any other method. This holds true for both

*Together with HARTING,
the test equipment manufacturer Softing IT Networks
has responded to the wishes of customers
and market developments.*

office environments and industrial applications. This is especially crucial for current Ethernet networks, which are much more sensitive than old analogue systems due to the higher frequencies involved.

Flexible connection technology is at least as important as the test device itself. In the industrial sector, there are various defined and set standards for Ethernet interfaces such as M12 circular connectors in D or X coding, RJ45 solutions, but also new standards such as ix Industrial® or the SPE interface T1 Industrial for single-pair cabling according to IEC 63171-6. In order to be able to connect the WireXpert flexibly on site, Softing relies on reliable connectivity provided by HARTING. In this context, the preLink® cabling system has proved particularly successful. The system is characterized by a termination block that is connected and contacted at the end of the cable. This can now be reversibly connected to the preLink® suitable variants of RJ45, M12 etc and can always be adapted to the conditions on site. At the other end the familiar Tera connector handles connection to the test instrument. Consequently, the adapter cable can thereby remain in the device during use and only needs to be adapted

to the corresponding connectivity of the test section at the end via the preLink® termination block.

HARTING, however, is not only equipping Softing with familiar standards, but also with newer solutions for miniaturized devices and future networks under the keyword IIoT – sensor to cloud. This applies to the ix Industrial® connector according to IEC 61076-3-124 which is the miniaturized alternative to the RJ45 as a 70% more compact solution in the device. And naturally, the SPE interface T1 Industrial according to IEC 63171-6. This interface will play an increasingly vital role in the next few years if, as expected, Single Pair Ethernet becomes the predominant standard in the field level in terms of Ethernet transmission.

For several years now, this successful co-operation has ensured the right connectivity on Softing test equipment, as well as meeting Softing's own high standards and aspirations with regard to quality and reliability. HARTING also maintains close cooperation with Fluke Networks in order to provide customers worldwide with suitable test fixtures for these measuring devices. A test adapter has already been

developed for the ix Industrial®, which can be obtained from HARTING and is supported by Fluke. We are also already working on the necessary test adapters for SPE. ■

WireXpert E2E:



Sample test track with Softing WireXpert 4500 and HARTING preLink® cabling system

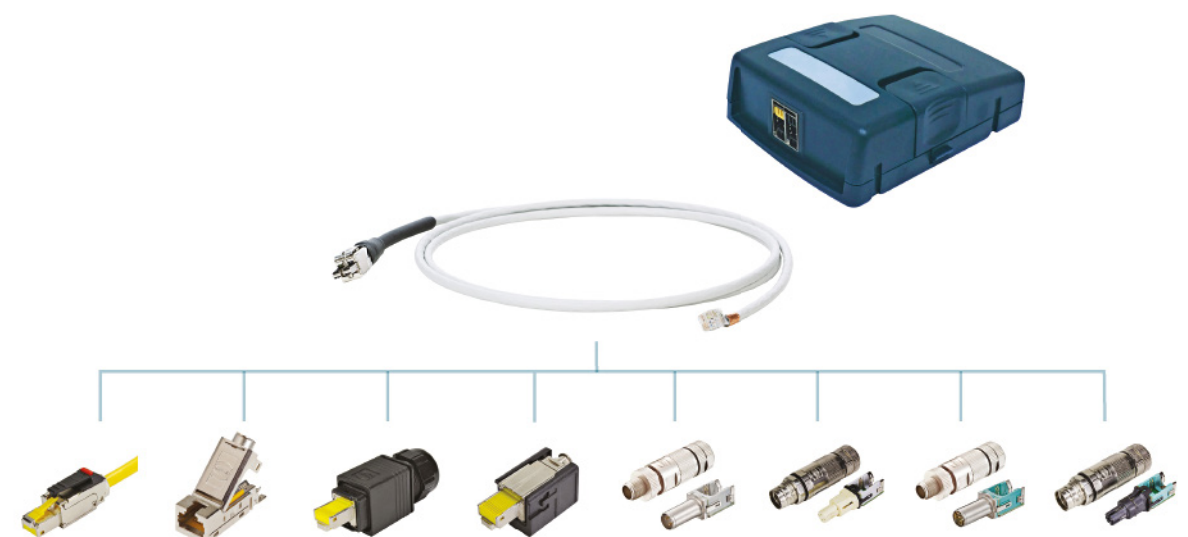
FLUKE
networks®

optimize!
softing

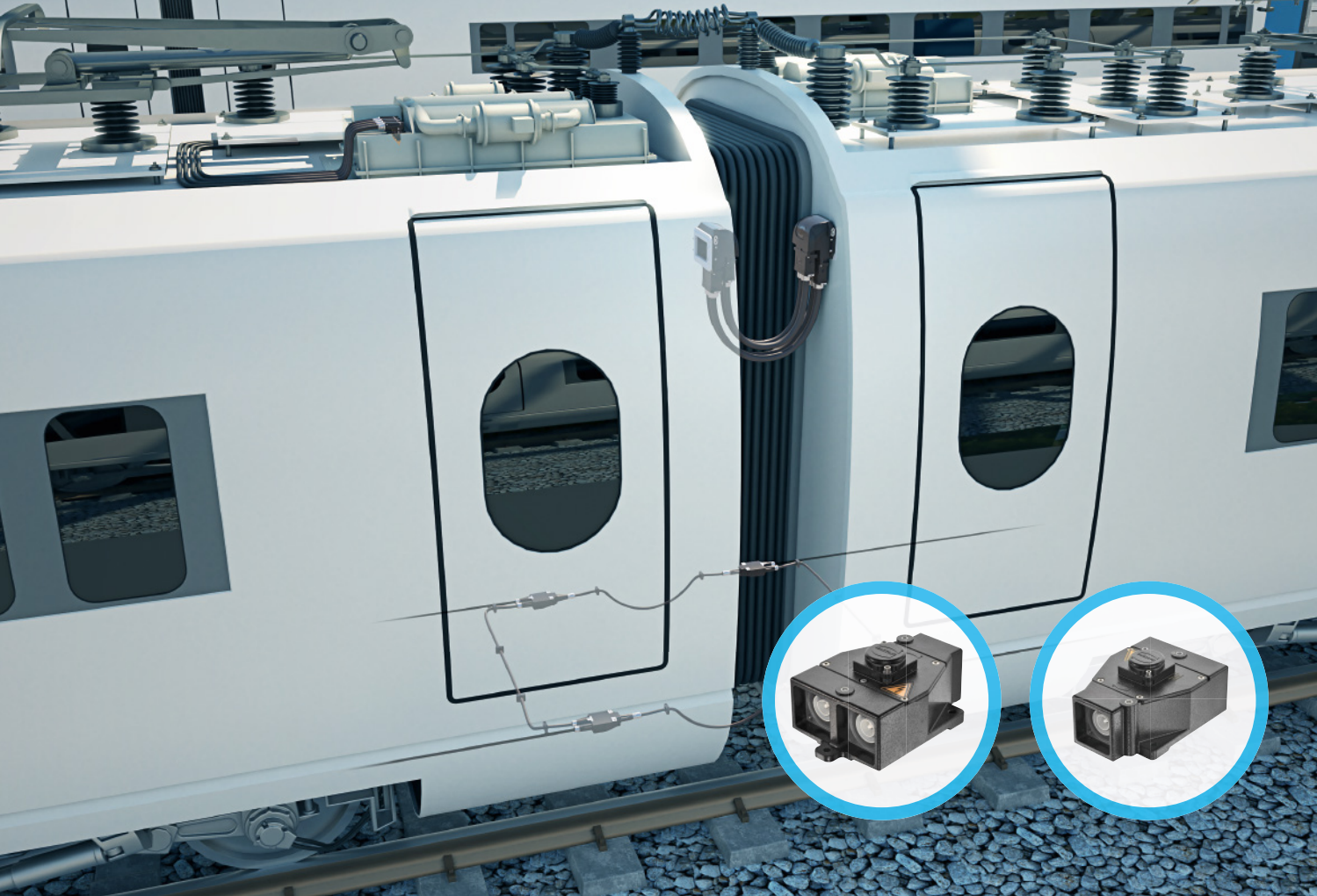
SPE

INDUSTRIAL
PARTNER
NETWORK

WireXpert industry adapter:



Quickly adaptable selection of industrial standard interfaces with HARTING preLink® cabling system.



TRAINPOWERLINE: SYSTEM SOLUTION FOR POWER DISTRIBUTION IN RAIL VEHICLE NETWORKS

Joining forces with a major train manufacturer, HARTING has developed a new interface for train busbars. Customer specifications stipulated a power supply system solution on the train that would be more flexible, more compact and lighter than existing solutions in accordance with UIC 552. Moreover, faster system assembly was called for, as well as the elimination of error patterns resulting from interfaces with ensuing repercussions on application safety.

The Han® HPR TrainPowerLine is the result of the joint development activities, a uniform Y-distributor with which the entire train busbar gains a plug-gable design. The five different interface types according to UIC 552 that have been standard to date will now be replaced by a uniform power interface for the entire energy distribution in the underfloor of each wagon. The advantages range from shorter installation times to more cost-efficient use of materials, compact design with significant weight reduction and uniform processes in assembly. By contrast with the previous system, the inter-car jumpers are plugged in at both ends.

The modular design enables the virtually complete pre-assembly of the TrainPowerLine. During installation on the vehicle, only the single-pole connectors have to be assembled and plugged into the TrainPowerLine Y-distributors. “This massively steps up the speed and security of the installation,” says Walter Gerstl, Global Account Manager at HARTING.

The TrainPowerLine is part of a system of interface components for the cabling of rail vehicles and locomotive-hauled trains.

Thanks to modularity, the number of different parts to be stocked is reduced, saving storage space and reducing administrative input. At the same time, user safety takes top priority. Male and female contacts of the TrainPowerLine are completely finger-proof. Regarding potential equalisation the respective connection points and conductive surfaces are provided on the mounting surfaces – added by a defined shielding of the pluggable inter-car

connection cables. The protection of the contacts has also been further upgraded: specifically inserted contours on the housings prevent standing ice formation, as the ice is discharged to the sides. The TrainPowerLine is an entirely new development for high voltage/current transmission. Designed for a continuous load of 800 A and more than 3000 V AC/DC, it meets all the electrotechnical requirements of a UIC 552 interface, although there is no interoperability with existing systems. The housings are made of corrosion-resistant die-cast aluminium, while the surfaces comply with the proven Han® HPR standard. As a result, the new Y-distributor is ideally equipped for the harsh environmental conditions in the underfloor area. “The challenge consisted of reinterpreting the existing standards and developing our own testing mechanisms,” as Denny Hellige, Product Manager at HARTING Electric, reported. Based on the specifications of the UIC standards – which have been in place for 40 years – the specifications were reinterpreted, while practicable scenarios were developed together with HARTING Corporate Technology Service and external auditing companies in order to be able to approve and release the system in accordance with market requirements.

The TrainPowerLine is part of a system of interface components for the cabling of rail vehicles and locomotive-hauled trains. The primary system is installed in the underfloor and extends to the roof of the vehicle, thereby supplying the various systems onboard trains.

Other new developments, such as the Han® HPTC series of transformer connectors for the connection between the transformer and the traction converter as well as the Han® HPR VarioShell for inter-car

jumpers, provide robust and versatile solutions for reliable jumper cable applications optimised for a long service life. According to this system concept, the HARTING components also remain interoperable in detail. The focus has been decidedly placed on the safety and longevity of the entire cabling infrastructure. ■

Summary: HARTING has substantially contributed to design high-performance, reliable and easy-to-install Han® HPR components for installation that meet the new demands, in order to expand the continuity of the power supply structure. “With our TPL, we are pleased to now be able to offer our customers a genuine alternative to previous solutions in the area of UIC 552 cabling, which reduces the workload and complexity by a significant measure,” as product manager Hellige stated.

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Retrofit: Keeping rail vehicles up to date

Rail vehicles rank among the so-called long-lived or even very long-lived assets. The extensive service life of rail vehicles is based on purely economic reasons. After all, a vehicle that is no longer usable after just a few years swallows up an high initial investment without yielding any returns. In order to remain state of the art for decades – and also to meet higher safety standards – the “retrofitting” of rail vehicles is coming into focus. By no means is this just a matter of replacing components that are subject to high mechanical stress during operation.



For example, it may be necessary to retrofit Passenger Information and Entertainment Systems (PIES) or to upgrade existing systems to the latest technical standards, to renew information monitors for the carriages or to set up individual displays at the seats. In the meantime, passengers expect charging facilities for laptops and smartphones, as well as access to a WiFi network. CCTV (Closed-circuit television) in individual train sections enhances the feeling of safety. In order to enable the supply, networking and safe functioning of all systems, HARTING is providing a broad portfolio of both connectors and ready-made cabling solutions. To ensure that these can then also be used individually in “plug & play” mode, HARTING product experts can take on the layout and design enabling the development of suitable retrofit solutions.

*A retrofitting does not end
when a wagon is completed,
but the entire train
must be at the same level
or standard.*

In addition to state-of-the-art infotainment, upgrades to safety-related systems may also be required in making rail vehicles fit for the future. The European Train Control System (ETCS) forms the foundation for a future uniform train control system on the continent and – over the long term – is intended to replace the

numerous different control systems in Europe. In this context, modernisation or retrofitting, for example of Ethernet cabling, will also be necessary for this.

When it comes to modernisation, it will not suffice to upgrade individual carriages. Rather, the entire train must embody the same technology level and meet the same standards throughout. This can be achieved with suitably designed wagon transition solutions, e.g. by means of so-called jumper cables, which ensure the smooth transmission of power, data and signals throughout the entire train. In addition to the individual design and manufacture of these jumper cables, HARTING is also positioned to provide other suitable solutions that will save time and money during retrofitting like distribution boxes for example.

Thanks to prefabricated connection plates, which allow a high density of connectors in a very compact space, space-saving expansions are possible in a short time span. Mechanical input is



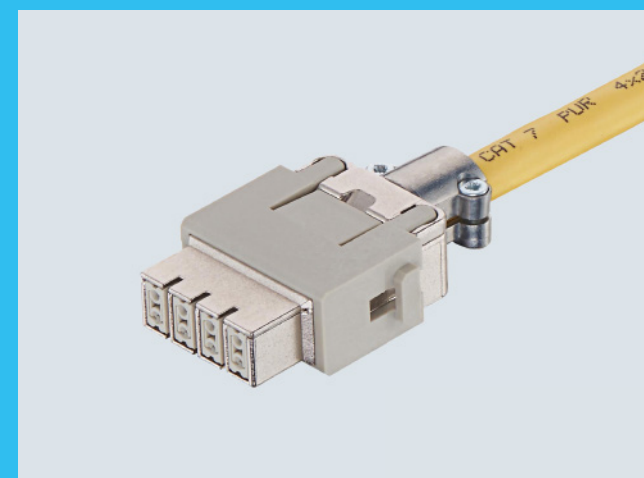
***HARTING has already
developed
a variety of interfaces for retrofit-
ing rail vehicles.
These are ready solutions!***

A mounting plate with four integrated bulkhead mounted housings for connectors of size Han® HPR 24 was specifically designed for railcar couplings. At the transition between the wagons, the interfaces – straight or angled hoods – can be plugged directly onto the pre-assembled mounting plate. Height-optimised, additional installation space is saved by recesses at the front. By opting for 8-fold Han-Modular® hinged frames, a total of up to 32 module slots are available in a very compact space.



Mounting plate with four cut-outs for quick installation of connectors: Recesses in the front help to save limited installation space in the railcar coupling area.

The Han® Gigabit module meets all the demands and requirements for the transmission of high data volumes in the railway sector. The module enables Ethernet transmission of Cat. 6A or Cat. 7A, for example to make passenger information systems and broadband Internet effective and future-proof. At the same time, all the relevant requirements such as resistance to shock and vibration and EMC shielding are fully met. Thanks to its special robustness and future compatibility, this module is particularly suitable for the high demands placed on the interfaces of jumper cable connections.



The Han Gigabit module enables a shock and vibration proof transmission of data on trains, especially effective when being used as part of jumper cable assemblies.

HARTING has now also developed a Han® M12 module for data transmission on trains. The module integrates two interfaces, either D- or X-coded, in one insulation body. The Han-Modular® module is thereby suitable for the transmission of signals, industrial buses or Ethernet. The packing density is doubled by comparison with existing systems. This means that there is more space available in the hinged frame for other functions. In addition to installation space, users save installation time due to the fact that the M12 module can be pre-assembled and mounted separately.

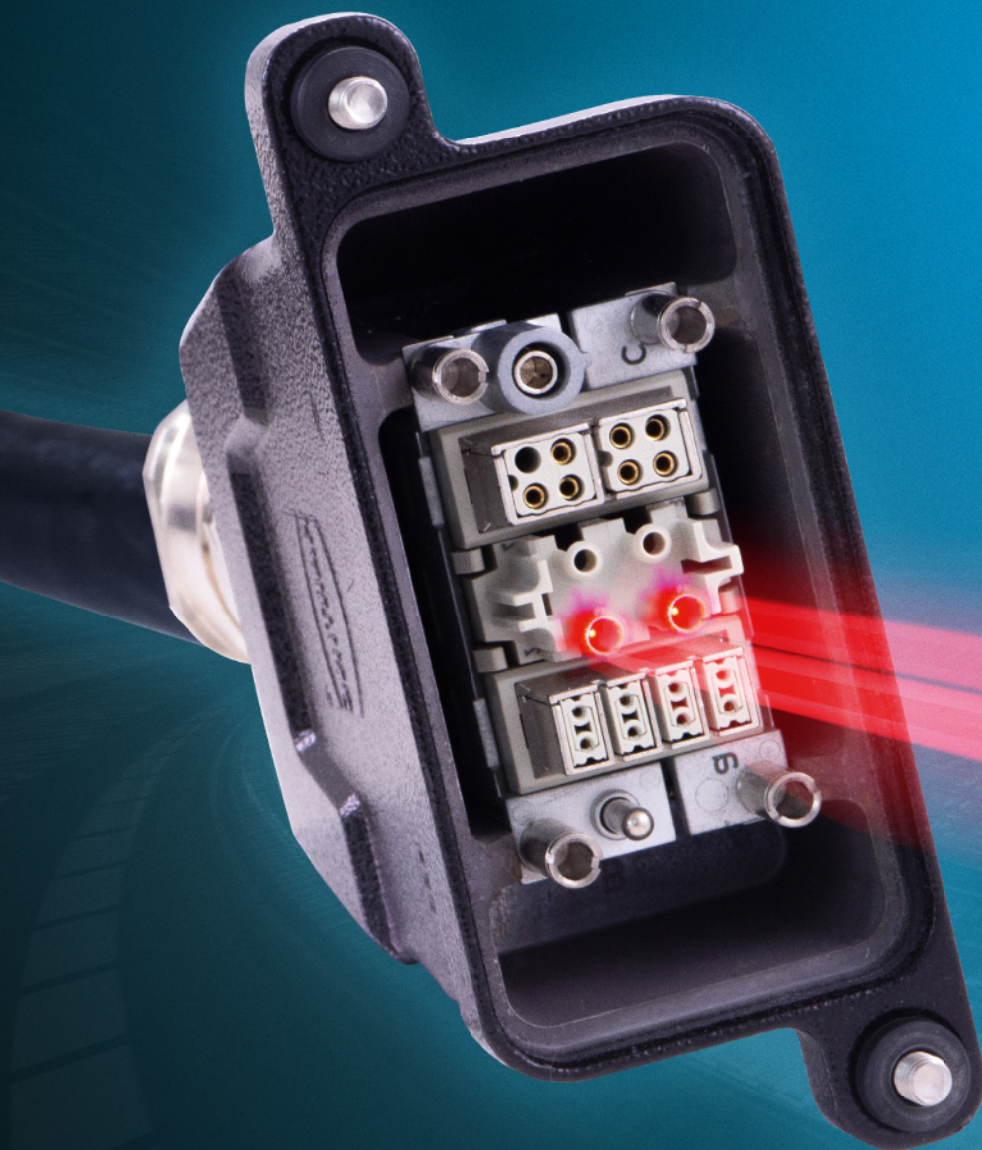


The Han® M12 module for Profibus and Ethernet applications: x- and d-coding options can be combined in one connector.

reduced as far as possible, as it is not necessary to cut a separate opening through the carriage wall or the base plate for each individual connection. In view of the pre-assembly factor, the installation time on the rail vehicle itself is further reduced, while the input required for wiring and testing on the vehicle is also trimmed down. The interface can remain individual and highly flexible, as HARTING connectors – especially from the Han-Modular® portfolio – offer countless combination options.

HARTING has already developed and adapted an entire range of interfaces for the retrofitting of rail vehicles, which are now available as ready-made solutions for other projects. ■

LONGER TRANSMISSION DISTANCES MATCHED BY LIGHTER WEIGHT



The need for powerful and secure networking has grown continuously in both private and industrial environments. Ever higher volumes and faster data streams are also taking increasingly higher priority in railway technology. Fibre optic cabling is playing a vital role here, as it enables the high data rates to be transmitted reliably and without interference, also over long distances.

There are different ways of using data streams on trains. While some passengers take care of business while travelling, other passengers will be looking for entertainment and diversion with their smartphones. Functions relevant to the train itself, however, such as the seat display and the log-in to the pre-reserved seat, are also handled via the data network, as is the transmission of data in the passenger information system.

In addition to these useful and pleasant aspects, the safety of the train ride also plays an important role. For example, data from CCTV (Closed Circuit Television) systems must be transmitted and distributed. This not only calls for higher transmission rates and larger bandwidths, but also transmission that is as interference-free as possible. Optical fibres, for example, have the advantage of being immune to external electromagnetic influences. Consequently, they can be routed directly next to components with high voltages, thus contributing to an increased safety in limited installation space.

HARTING is offering a broad range of interfaces for speed and weight-optimised data cabling in trains. The HARTING Push-Pull V4 (HPP V4) is a particularly practical “container” enabling a wealth of possible functions. Originally developed for Ethernet cabling in industrial buildings, this product impresses above all thanks to its universality, robustness, and fast, secure installation. An audible “click” when plugged in gives users feedback that the connection is mated and watertight (IP 65 / 68) and closed, while installation is entirely tool-free. HARTING is providing the HPP V4, which has been tested and approved for railway use, in combination

with ready-assembled fibre optic cables for setting up train networks. The connector, however, is also available for individual solutions.

The Han-Modular® series opens up particularly versatile solutions for data transmission in trains. Here, in addition to the copper-based, very powerful Gigabit module, Cat. 7A, there are also the LC and SC modules for fibre optic contacts. The main difference between the two F.O. connectors is the possible packing density. The SC module accommodates up to four fibre optic contacts, while the LC module takes capacity up to six (for GI fibre 50-62.5/125 µm as well as single-mode fibres).

Up to eight individual modules fit into a Han-Modular® hinged frame. Integrated into a Han® housing, the two fibre optic connectors achieve the high protection class IP68 / 69K. In this way, with the help of jumper cables and switches, a fibre-optic-based network can be extended over the entire train. If separate fibre optic cabling is required, the SC module can also be placed as a single connector in the very compact Han® 3A size housings.

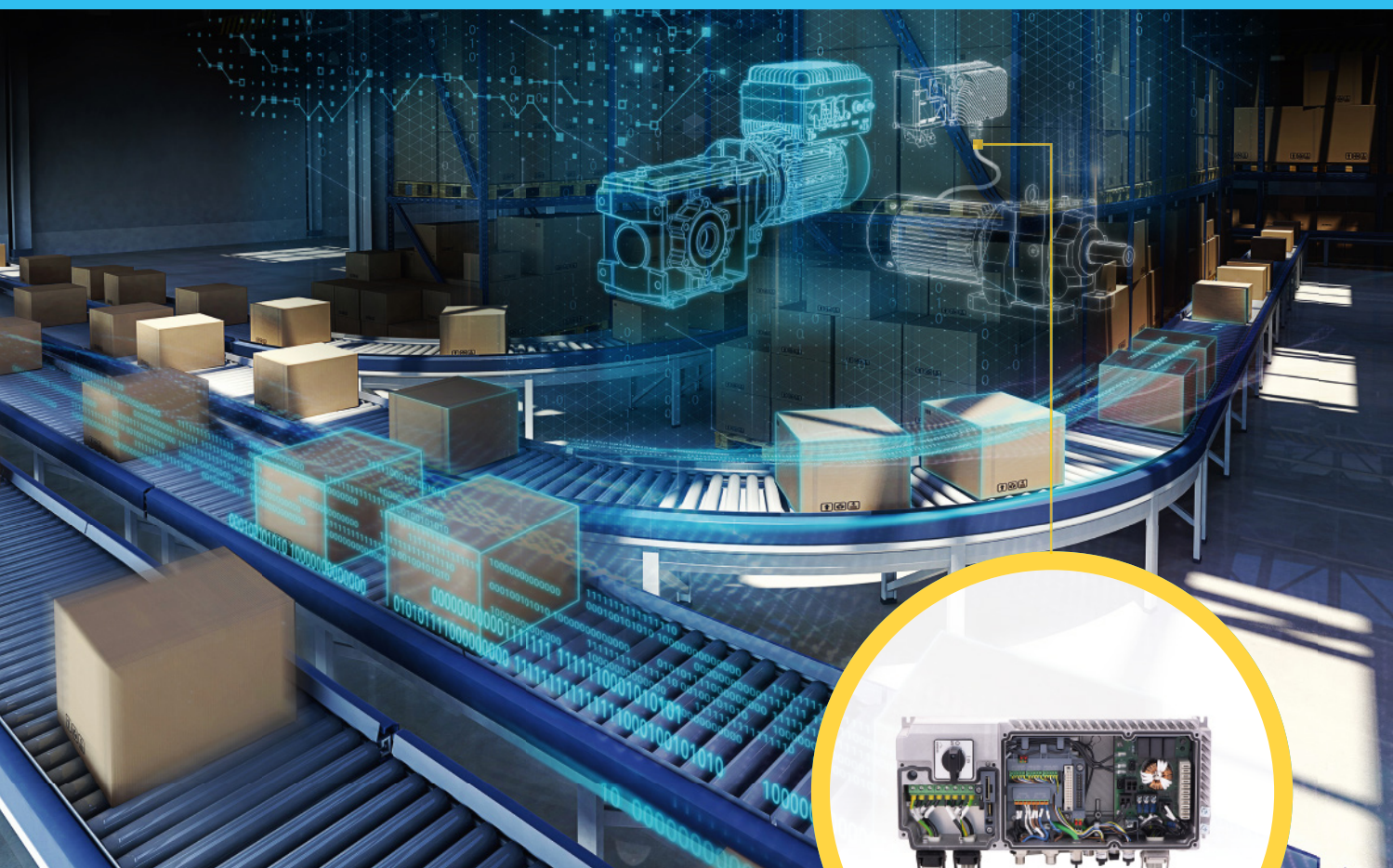
Fibre optic networks for rail vehicles can be set up very efficiently and in a

space-saving manner with the aid of switches that feature an F.O. Han® 3A interface. If the devices are flat enough, they can be installed in very high packing density in the control cabinets. For such requirements, HARTING is offering entirely pre-assembled network layouts tailored to the respective application, combining high-performance switches with suitable cable assemblies and Han® 3A interfaces. Fibre optic cables are not only space saving, they are also considerably lighter than conventional copper cables (30 to 40% less with Cat.7 installation). In addition to many components for secure and protected transmission in fibre optic technology, HARTING is also offering the engineering, design and production of the complete interface for the backbone and the carriage transitions. Tailored to the installation situation and the environmental requirements, HARTING is always able to find the ideal solution – from individual components to complete solutions ready for installation. ■

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THE COMPLETE PROGRAM

Partnership-based development of an all-round solution



The perspective on the interior of the SINAMICS G115D shows the various interfaces.

Perfect, efficient solutions can result from joint engineering and the combination of in-depth know-how. Siemens and HARTING product experts proved this fact in their development of a new generation of frequency converters.

For about 20 years now, the HARTING Technology Group has been supplying system solutions for the connection of decentralized drive units in the field of intralogistics – initially with a focus on the 400V AC and 24 V DC level. These activities have resulted in a committed, intensive partnership between Siemens and HARTING, especially in this area, and is now being continued with the development of a new distributed drive system, the SINAMICS G115D from Siemens. The system is developed for horizontal conveyor systems, such as those found in airports or in intralogistics.

The development partnership proved the key to joint success here. In this approach, the expert knowledge contributed by both partners added up to create a future-proof, sustainable and efficient solution. As a further development of the predecessor models of the SINAMICS G115D, Siemens, when defining general specifications, placed particular emphasis on the factors of robustness, stability and compactness when defining the general conditions. A new electronic module, additional functionality for the drive and

the requirement that the device be geared towards energy efficiency comprised the focus of the development activities. With regards to mounting directly on the geared motor, the compact design provides a clear advantage. In order to meet this requirement, the inverter contains internally DIN plug connectors and, as a

The development partnership proved the key to joint success here.

product innovation, plug connectors from the har-drive series. These were specially developed for the requirements in drive systems and adapted to the compact design of the frequency inverter. Special attention was given to simple, convenient handling and safe contact under all mating conditions. The har-drive contours provide contact protection on both sides, as well as robust guidance in the event of faulty mating.

Outside of the SINAMICS G115D, not only the HARTING Compact® interfaces (Q8

and Q4/2), which have virtually become standard in drive technology, are finding use. These are supplemented by M12 circular connectors for signal transmission. Thanks to suitably prefabricated cable assemblies, the connection and networking within the conveyor systems readily achieves "plug & play" mode.

Moreover, the team of the HARTING Competence Center "Intralogistic & Conveyor Systems" integrated their extensive know-how revolving around connectors in finding a successful, cooperation-based solution, thereby writing new chapters to the success story shared by both companies. ■

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INDIA:

Rail with future and tradition

With its nearly 1.4 billion inhabitants, the Indian subcontinent boasts enormous potential over the next few years. For HARTING, India’s national rail market plays a particularly important role in terms of growth prospects. The country’s ongoing modernisation and multi-billion dollar investments tell you all you need to know: each year, trains are the most important means of transport for some eight billion passengers, with the rail network slated to be expanded by a total of 22,825 kilometres by 2024. Progress is also being made to electrify an additional 38,000 kilometers of rail, while 8,600 train stations are being modernised.

Since 2008, HARTING’s Chennai-based subsidiary has been responsible for manufacturing housings, cable harnesses and cable assemblies for customers in rail

technology and mechanical engineering. The company has notched up resounding success: for two decades now, HARTING India has maintained its position among



„Best Connector Company“ Award

India’s market leaders in the field of robust industrial solutions.

India’s upward growth curve goes hand in hand with HARTING’s capacity expansion there. The square footage of the new HARTING production facility opened early in 2017 was doubled just one year later.

Even India’s own specialist media confirm that HARTING is on the right track, e.g. trade media platform BISinfotech conferred the title of “Best Connector Company” on our subsidiary. The platform also bestowed the coveted BETA Award (BIS Excellence & Technovation Awards) on the team that works for Managing Director Dr Girish Rao, with the award strengthening the subsidiary's position on the Indian market. ■



Source: Darjeeling Himalayan Railway in India, halftone print, published 1897

The triumphant advance of railway in India stretches all the way back to April 1853. The first railway connection in the entire Asian region stretched from Bombay to Thane. The connection was made possible by the “Great Indian Peninsular Railway”, a private railway company that had previously received a concession from the East India Company to build it. It only took another 40 years to connect all of the country’s important regions via a railway network, with the British colonial administration supporting private companies in the network’s implementation.

READ AND WIN!



Solve our puzzle and send the missing word to tecnews@HARTING.com

Knowledge and technology transfer initiative

Profound development

Modernisation concept

Connectivity of the future

Data network standard

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	E		T		N	
	R		O	F	T	
C		N		I		+
		T	E	R	E	

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Your tec.news editorial team

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Pushing Performance

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