PRESS-INFORMATION

Automotive industry driving the potential of Ethernet

Even if negative reports are currently dominating the news about the automotive industry Simon Seereiner, Portfolio Manager for Industrial Ethernet at Weidmüller, expects a wave of innovation to roll through the production halls of the automobilists. Resolute implementation of Industrial Ethernet in new projects aims to realise cost saving potentials at the body-in-white stage. A new connector variant accompanies triumphant leap forward.

Simon Seereiner is Portfolio Manager for Industrial Ethernet at Weidmüller Interface GmbH in Detmold, Germany

A paradigm change is presently taking place in the automotive industry: there is a move away from the present-day solution of chiefly deploying the fieldbus systems Profibus and Interbus towards Ethernet technologies such as Profinet, informs S. Seereiner. Projects reflecting this change are currently being implemented at Daimler, Audi, VW and elsewhere. "With regard to Industrial Ethernet we have left the experimental phase behind us and are now moving on to real applications. And the automotive industry is the first sector in which this change is being resolutely implemented – from the robotic production line all the way through to the inside of the electrical cabinet." This is borne out by the current increase in sales figures for this sector. He points to the established standards in the sector, such as Profinet, as one reason why the automotive industry is assuming the vanguard role. "The Profinet installation guidelines are now being resolutely implemented" he adds.

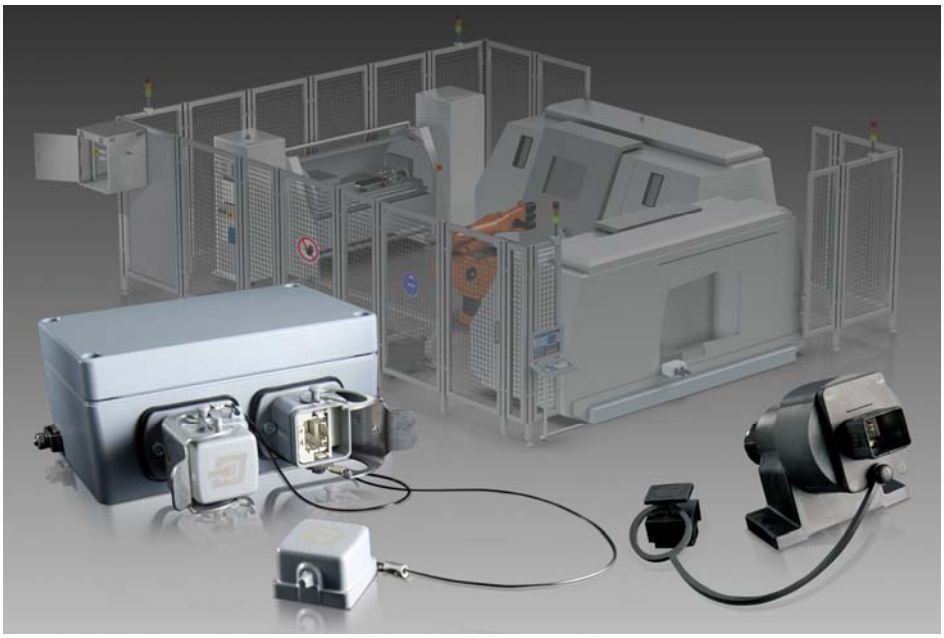
These guidelines define connection lengths, connectors and cables specifically for Profinet as well as their Profinet-conform installation.
Manufacturers of the corresponding infrastructure components, such as Weidmüller, have completed the groundwork and are equipped to provide solutions. However, it should be noted that this company is not moving into unknown territory. "We have been supplying our products to the automotive industry for many years. From terminal blocks in electrical cabinets to electronic modules, overvoltage protection components through to managed and unmanaged switches, routers, WLAN Access Points and so forth our products are in the meantime being utilised in a wide range of applications dedicated to the production of motor vehicles" the portfolio manager informs us.

The benefits of *STEADYTEC*® technology

Weidmüller sees itself as a supplier of tailor-made solutions for its customers. "When discussing Industrial Ethernet, active switch technology represents one side of the equation and the connectors the other – the passive side. We can now rightly claim to offer a wide range of products in this field, declares S. Seereiner. As an example he names the IEC-conform connector variants 1, 4, 5 and 6 (to IEC 61076-3-106). As well as being available with IP20 and IP67 protection class ratings they are suitable for both copper and fibre-optic cables. Not to forget that all of the relevant industrial connections such as RJ-45, M12, SC and so forth are covered.

Thanks to ***STEADY****TEC*® technology the user enjoys special advantages when deploying IE-Line connectors. This offers him a coherent system that harmoniously combines both connector and connection technologies. All components of this plug-in system and their installation have been designed to ensure harmonised compatibility and guarantee transmission rates up to 10 Gbit/s along the entire transmission path – from the floor distributor through to the machine. "We have placed our faith in a modular platform concept for our IE-Line of connectors with ***STEADY****TEC*® technology. ***STEADY****TEC*® technology integrates not just one but several technologies at the same time in a single, coherent and holistic concept" S. Seereiner points out. He makes clear, "That applies in equal measure to the contacts, the housing including materials and sealing as well as handling quality. Installation, marking, cable seals and strain relief are also based on a seamless concept." He succinctly expresses the

more essential advantages with four adjectives: reliable, simple, fast and solutions-based.



All components featuring *STEADY*TEC® technology as well as all aspects of their installation are designed to ensure compatibility – from the floor distributor through to the machine. These also include IP67-rated junction boxes and surface-mounted socket outlets.

The connector variant 14

The latest addition to the IE-Line of plug-in connectors is the so-called variant 14, which is specified in the standard IEC/PAS 61076-3-117. This refers to network cabling in production plants in which a variety of topologies and applications through to automation cells are present in some measure as, for example, is the case in the automotive industry. High data transmission performances up to 10-Gbit Ethernet, the flexibility to choose between fibre-optic and copper cables as well as uncomplicated connection technologies are in demand in this sector. "In addition," cautions S. Seereiner, "a universal cabling solution reaching from the office world down to the field level must pay attention to connector compatibility at the interface between the manufacturing and IT

networks." Variant 14 combines all of these requirements, which is why the Aida has committed itself to utilising this connector.

Aida is the Automation Initiative of German Automobile Manufacturers founded by Audi, BMW, Daimler, Porsche and VW. They have agreed a mutual approach to the topic of Industrial Ethernet; in 2004 they came out in favour of Profinet with the aim of creating a simple and universal solution for connecting the automation components utilised in the industry. They also agreed upon a standard Profinet plug-in connector: Variant 14. This is a rectangular connector with push-pull coupling technology. The protective housing has been designed for applications requiring eight-pole shielded and unshielded connectors, for frequencies up to 500 MHz in Category 6A cabling in industrial environments. It is designed to accommodate RJ-45 or SC-RJ inserts.

"Our IE-Line variant 14 connector will be ready for series production in time for the Hanover Trade Fair in 2009. That does not mean we are the first supplier with a connector of this type on the market; however, we have carried out extensive market research so that we are now able to supply the market with mature products. He cites the simple connection technology as a key feature of the company’s own products and offers an example to back up his claim: "When a worker in a factory hall sees a machine error displayed in the middle of the night and knows, thanks to Ethernet, that a connector is defective, he wants to be able to replace it fast and without any complications. That means as few components as possible and as a result as little potential for errors as possible. And that is exactly what we have implemented with our IE-Line. He cites the data transmission rate as a further outstanding feature. "At the present time 100 Mbit/s are defined for Profinet. However, we see today a whole range of applications that already require 1 Gbit Ethernet", the expert explains. Currently, Cat. 6A has been adopted and with that 10-Gbit Ethernet. "With GHMT and 3P certification we are presently the only manufacturer that can verify that his industry-suitable RJ-45 and V14 connectors are capable of transmitting 10 Gbit Ethernet", he proudly reports. He points to the freedom to choose between copper or fibre-optic transmission media as well as contact reliability and their suitability for use in industrial applications as further significant distinguishing criteria that set the IE-Line apart from its competitors. "Simple connection technology, modular system compatibility, high data transmission performance as well as high levels of reliability" he again recaps the more outstanding characteristics that it has also been possible to achieve thanks to the modular

***STEADY**TEC*® concept. From a price point of view there is hardly any difference to the products offered by competitors.

Examples of the *STEADYTEC*® variant 14 as it is utilised in the automotive industry**

The question now is what makes S. Seereiner so confident at times like these that the hard-pressed automotive industry of all sectors will continue to press ahead with the introduction of Profinet across all areas of the industry. "The groundwork has been laid and tests successfully completed to enable the switchover from Profibus to go ahead. Now the desire is to take full advantage of the potential for savings that a seamless Ethernet network solution has to offer. Daimler will achieve this goal for the first time with a new production line for a new model", informs S. Seereiner. "We assume that further projects will follow quickly once this and other projects presently at the planning stage have been successfully implemented", he explains and makes clear, "If Daimler is able to significantly reduce the production costs for one of its new models at the body-in-white stage, because it is possible to process all of the requisite technical data of all robots and each and every weld spot, then further products are inevitable." He expects further stimulus for his own company’s products from

the manufacturers of automation technology. Continued implementation of the installation guidelines should also see them offering their products with the corresponding functionality. "These will require the special interfaces that are already on offer today with ***STEADY****TEC*®", explains S. Seereiner.

Aida: many projects with Profinet

The Automation Initiative of German Automobile Manufacturers was founded by Audi, BMW, Volkswagen, Daimler and Porsche. In order to bring about standardisation in the field of Industrial Ethernet these companies have jointly agreed to utilise only Profinet on their new plant. According to Josef Margraf[1], responsible for control systems in Ingolstadt, Audi began implementing the first Profinet installations on their plant back in 2006.

Arjen Kreis[2], in charge of coordinating the automation team responsible for car-body construction at Audi AG in Neckarsulm, emphasises the significance of Profisafe in conjunction with Profinet for projects at Audi. Profinet and Profisafe were utilised together for the first time in the Audi A8 project. Further Profinet applications at Audi include the A4 projects in Neckarsulm and Ingolstadt, the A5, Q5 and A1 projects in Brussels as well as the successor to the A6.

According to Peter Ziegler[3] BMW has also made an unambiguous decision in favour of the Industrial Ethernet standard issued by the PUO. For example the 7 series BMW in Dingolfing is manufactured on plant running Profinet and Profisafe. The plant on which the Z4 car-body is produced is also furnished with Profinet.

And neither is Volkswagen dragging its heels when it comes to implementing the Industrial Ethernet protocol: Having installed Profinet onto a pilot plant producing the Tiguan and Golf 6 for test purposes VW is now rolling out diverse large-scale projects in which the Profinet protocol has been implemented, for example in Kaluga, Russia and Pune in India. According to Roland Schley[4], responsible for planning automation of new plant at VW in Wolfsburg, "There are no ifs or buts VW is moving forward with Profinet in combination with Profisafe technology."

Jürgen Kübler[5], responsible for process development and simulation at Daimler AG in Sindelfingen, Germany also emphasises that the internal Daimler standard 'Integra' has been supplemented with Profinet and Profisafe; this standard was originally based on Profibus. The technology has already been implemented on the truck production line at the Mercedes-Benz factory in Wörth, Germany. Projects for the new A and B Class vehicles will soon be added. J. Kübler assures that the new plant will be erected exclusively in conjunction with Profinet and Profisafe.

The motor-vehicle manufacturers are holding intensive discussions with their machine and plant suppliers to ensure they implement Profinet. "One standard across the entire factory" would be desirable according to J. Kübler. R. Schley again names the main advantages of this arrangement for Profinet: "In the past we had to run two cables for Interbus and Ethernet TCP/IP; today we need only one for Profinet." That results in savings in the often widespread plant required in the automotive industry. According to J. Kübler users place a great deal of importance on the simple handling characteristics above all else. When introduced in plant solutions Profinet IO is sufficiently powerful to satisfy requirements for real-time communication. The Aida anticipates new impetus from the planned Professional Energy-Profile for Profinet, which is due to carry out energy management tasks in the plant.

Ronald Heinze

[1] ***Josef Margraf,*** *responsible for control technology at Audi*
[2] ***Arjen Kreis*** *is head of coordination at Audi for the automation team responsible for car-body construction*
[3] ***Peter Ziegler****, BMW*
[4] ***Roland Schley****, responsible for planning automation of new plant at VW*
[5] ***Jürgen Kübler****, responsible for process development and simulation at Daimler*

Open for other variants

Amongst others he cites Variant 1 as a further IEC standardised connector variant for Industrial Ethernet. This is a round connector equipped with a

bayonet locking mechanism that is preferred by Rockwell Automation and Allen-Bradley, and as such that means it represents the standard in conjunction with Ethernet/IP. The international standard defines the Variant 4 push-pull mechanism for the structured cabling of production halls.
"We have not committed ourselves to a single protocol, rather our modular ***STEADY****TEC*® technology facilitates the possibility of implementing the appropriate interface for all three relevant protocols", says S. Seereiner and explains further, "That means our technology can be utilised by Daimler as well as GM and in production halls in general."
He feels it is regrettable that at present only the cabling and connection technologies have been defined by way of installation guidelines for the Industrial Ethernet protocols Profinet and Ethernet/IP. "That does not apply to other Industrial Ethernet protocols such as Ethercat or Powerlink. The powers that be behind these technologies show no interest in standardising the inter-faces", informs S. Seereiner. From his point of view this is an inauspicious state of affairs, as the different systems require adapter cables that cause more work and result in higher costs.
The hybrid connector is another topic where work is presently in progress; this offers the option of Ethernet data transmissions alongside 24-V auxiliary voltage within a single connector mating face. According to the Industrial Ethernet specialist, "the challenge here is to transmit similar quantities of auxiliary power, IO signals and Ethernet data as is presently available through the RJ-45".
"That is a topic looking towards the future – and not just in the automotive industry. The aim is to move away from the wide variety of power and data connectors, and move towards a system that covers both" he says; at the same time he is confident that, "Following on from Ethernet hype this will become the next hype topic." Weidmüller expects to present a solution in time for the SPS/IPC/Drives 2009.
With regard to the ***STEADY****TEC*® cooperation he cites junction box technology and fibre-optics as topics that will head the priority lists of the BTR/Telegärtner/ Weidmüller alliance. "It is true that we already have fibre-optic interfaces in our assortment, but there will be additions in this area", he explains and then adds, "We are still far from reaching the end of our innovations."

Inge Hübner

An overview of the advantages offered by *STEADYTEC*®

Reliability
... this is achieved by optimising material characteristics, sealing properties, greater housing stability and improved contact reliability.

Simplicity
... refers to the marking options with an industrial-standard marking pen, the installation that requires no tools for on-the-spot termination in the field, pre-assembled housing and inserts, colour coding by means of coloured rings as well as cable sealing and strain relief by means of a collet cage.

Fast
... on the one hand this refers to the installation characteristics and on the other to the high transmission properties.

Solutions based
... means universal connector and connection technology from a single-source supplier – in the electrical cabinet, floor distributor, machine distributor and Ethernet device. That all adds up to a reliable connection solution for every industrial application.

Further informationen: **www.steadytec.com**