

Know what's coming

Modular RFID system for safe data transmission in temperature ranges up to 210 °C



(Source: Volkswagen Sachsen GmbH, Zwickau)

Figure 1: At Volkswagen Sachsen FRAM data carriers are already in use on conveyor lines

very first RFID technology. Modern data carriers feature a write capable memory based on EEPROMs, and in more recent times, even FRAM technology is available with memory sizes up to 64 kBytes. FRAMs can be written to at least 10^{10} times (EEPROMs only up to 5×10^5 times) and even feature a significantly higher speed of more than 10 m/s, so that reading and writing "on the fly" is possible. If high demands are placed on speed, or if data must be repeatedly stored on the TAG, the only choice of data carrier can be FRAM memory. If for example data were written onto an EEPROM every second, the memory is no longer safe to use after just 6 days whereas this would only be the case after 300 years with the FRAM.

Dirk Schaar

Radio Frequency Identification technology is nothing new! In many areas - be it in the flow of goods of large supermarket chains, on identity cards and customer cards - it has already become established. Industrial manufacturing has been applying RFID systems practically unnoticed by the public eye for a number of years. What are the characteristic features of the industry, where these systems are used and what exactly are they? We can clarify this based on a completely new RFID system, which beats all the available systems in terms of security, speed, longevity and flexibility.

This article is based on information supplied by Hans Turck GmbH & Co. KG, Mülheim a.d.R.

Let us first of all examine the modern manufacturing process using car production as an example. The developments in the industry have led to the "personalised automobile" which inevitably lead to the introduction of RFID systems. In earlier years the cars were usually purchased "off the peg", whereas today the customer chooses the features for each vehicle beforehand. It is necessary to somehow mark these individual features throughout the production process in order to provide transparency at all times. And this is exactly what happens at Volkswagen Sachsen GmbH. In order to guarantee smooth data traffic on the electrical suspension monorail, the Mosel factory has also started a field test of the new RFID system BLident from Turck. The Ford factory in Genk is also applying this new generation technology. More than 4000 data carriers are now in use there.

Writing "on the fly"

An RFID system always consists of data carriers (TAGs), read-write heads (transceivers), interface modules, the higher-levels of controls as well as the software required for implementation. The similarity with identification systems based on barcodes is amazing. Barcode labels are only effective in one direction, they can only be read. This also applied to the

When it gets "hot" too

"Up to this point it was only possible to integrate a data carrier for process monitoring into the high temperature range after considerable technical effort and a lot of expense. An absolute level of process security was still not assured. A total loss of the data carriers were a daily occurrence", according to Walter Hein, Product manager RFID at Turck, as he addressed the previous problems. It was still not possible to immediately perform read or write operations after they had passed through a high temperature zone, e.g. such as an curing oven in the automobile industry. Precious time was lost in the manufacturing process. "We



Figure 2: The modular RFID system BLident meets the demands of a modern manufacturing environment

examined this key application

and worked out a solution for BLident which eliminated these disadvantages. Heat resistant data carriers up to 210 °C now allow for a flexible system integration", according to Hein. Immediate reading and writing of the data carrier after being subjected to heat enhances the productivity and efficiency of the system. The space-saving housing design of the high-temperature data carrier make an adaptation even in narrow applications possible. With the corresponding ambient temperature they guarantee the retention of data for at least 10 years. They are considerably faster than conventional 125 kHz systems with their frequency of 13.56 MHz. Optional EEPROM or FRAM memory is available.

Connection to "above"

The connection of RFID systems to the control world is not without its own difficulties. They are sometimes the subject of delays and difficulties in the communication channels. Accordingly, the reaction times and the application speeds are reduced and the manufacturing costs are increased unnecessarily. "BLident relies on the separation in this case, i.e. the asynchronous processing of individual commands. Accordingly, read and write commands can be saved independently of the physical presence of the data carrier in the so-called "air-interface" of the transceiver in the interface modules.", was the comment from Frans Brouwer, Business Development Manager at Turck concerning the advantages. As soon as a data carrier enters the "air-interface" they are processed without delay. Theoretical application speeds of up to 30 m/s are possible. The read data is stored in interface modules and can be requested successively from the higher control levels without a time lag occurring in the application.

With the integration into the control world, the BLident has the option in most applications to fall back on standards used such as Profibus, DeviceNet or Ethernet. The so-called standard function module simplifies the integration into the control world. The modular concept provides the user with a tailor-made solution for both the installation in a control cabinet (protection degree IP 20) as well as for mounting in the field (protection degree IP67). Depending on the requirement an interface module featuring up to 8-channels can be implemented immediately or later. All channels operate in parallel, so that there is no delay in the communication between data carriers and modules. Further functions, such as the intended switch off of individual heads if they are installed adjacent to one another are integrated.



Figure 3: "Its child's play" to find the right system with the configurator

Selection is "child's play"

"We provide a Windows CE based handheld (IP67) for reading and writing data carriers onsite. All data carriers can be easily programmed as a result", according to Brouwer, the data is presented on an illuminated touchscreen (displayed in decimal, binary, hexadecimal and ASCII code) and can be edited here and written to the respective data carrier if necessary.

When RFID systems are used there are always the questions relating to the air-interface, e.g. "How fast and at which distance can I move the data carrier past the write-read heads?" That is to say that there is always a certain amount of uncertainty concerning the range of applications. Details such as "recommended write-read distance" or "transmission speed = 0.5 ms/byte" are usually not sufficient for evaluation of the usage of the devices in a determined application, as the application variables such as data quantity, speed and distance are the result of a complex interaction between the read-write heads and data carriers. With the BLident configurator the respective applications can now be simulated on the Internet and the correct pre-selection of the individual components can be made. The setting of applications parameters by "playing" with the values allows the user to easily test the options and limits associated with the respective combinations.

"BLident incorporates many features of previous RFID systems and combines them with the new innovations, to provide a solution in which the demands of modern manufacturing, e.g. in automobile manufacture, logistics as well as in the pharmaceutical, chemical and petrochemical industries are combined with "more" functionality and flexibility and the need for cost optimisation. This is how the user always knows what's coming", is Hein's summary of the benefits of the modular system.

TURCK

000