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The world is in disarray, still.

There have been many changes. Circumstances we take for granted have revealed their enormous significance through the limitations imposed by the COVID-19 pandemic.

One essential fact remains true at WASA however: Our actions have always been guided by the virtues of decisiveness, diligence and prudence. For more than 60 years. Every day.
For our customers. For you.

To one hundred per cent.

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Unequivocal production board identification with RFID

■ Tobias Hess, Wasa AG, Germany

The importance of Industry 4.0 is also increasingly gaining in significance in the field of concrete block product manufacturing. What was originally perceived as a technology to be found in the automotive and food industries, is already being employed in a variety of ways in the concrete block industry. Wasa is also continuously working on advanced implementation solutions as to how RFID technology can find its way into the production board domain.
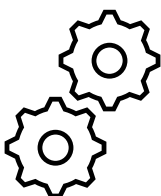
The term "Industry 4.0" is often happily utilised these days without having understood or at least questioned its historical origins. However, this is nonetheless meaningful to be able to understand the triumphant advances that RFID technology has made in recent years. This article takes a brief look back, examines the status quo, and ventures a glimpse into the future of all that the new technology is capable of.

In the course of history, there have been several industrial revolutions which have significantly contributed to increasing efficiency and quality. As early as the end of the 18th century, the first industrial revolution took place, driven by the use of mechanical equipment mostly powered by steam or water. Mass production in the form of assembly line production and the exploitation of electric power followed 100 years afterwards at the end of the late 19th century. Another hundred years later – after 1969 –, automation and the utilisation of modern electronics revolutionised industry again.
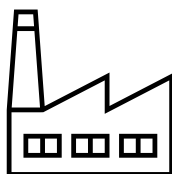
Nowadays, people refer to Industry 4.0, which deals with the intelligent networking of machines and processes with the help of information and communication technology.

Digitisation is now also omnipresent even in the private sphere. Mobile communications, managing your own home from on holiday via a Smartphone app, calling up information and data from anywhere and at any time – these things are no longer the exception, but standard today. "Online at any time" is the name of the game. In the private sphere, it is often a matter of convenience or gimmicks; in terms of industry, the focus is on increasing efficiency and quality in manufacturing products.
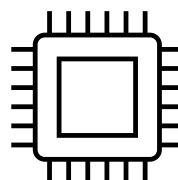
Important insights can be gained in producing concrete blocks with the help of data collection and evaluation as well. With the appropriate technology, it is already possible to systematically track all information – beginning with the request for raw materials and ending with the creation of the invoice and delivery note for a product. Both the internal and external communication of information is already taken for granted in many application examples, e.g. order or shipping information in online retail. The extent to which such a high level of detail is desired by companies varies, depending on who is asked. The requirements and wishes of users range from the simple transfer of a mixing recipe to the seamless recording of all machine and environmental parameters. It must of

Industry 1.0	**Industry 2.0**	**Industry 3.0**	**Industry 4.0**
Mechanisation	Electric Energy	Electronics	Networks
Steam Power	Assembly Line	Automation	Cyber-Physical Systems
1784	**1870**	**1969**	**Today**

Stages to Industry 4.0

course also be borne in mind that, depending on the scope of the evaluations or information, appropriate interfaces or systems must be available.

For Wasa, known as an innovative company since its inception, it is also a matter of course to engage in the appropriate way and be a competent partner for our customers. In order to ensure this, Wasa is working in the field of RFID technology both on the reliable allocation of data and on research into future possibilities for expansion and inferences, which are not yet being interpreted at the current state of affairs. With the help of board identification, information such as mix, machine parameters, product weight, curing times, etc. can be directly assigned to a product or production board and tracked through the entire process right up to packaging.

It was already common practice in the past to collect data in a mixing plant and record it over a longer period of time. Each individual mix is assigned a mix number, which is then stored over the long term. The transfer of information to the concrete block machine is also still easy to manage. However, things become significantly more difficult when it comes to transporting this information through the entire system. The transfer of production board ID via software is possible to a certain extent but, after any manual intervention, the resulting errors must also be corrected manually. On top of this, the programming effort grows exponentially with the complexity of the system and with it also the potential for errors.

To avoid this problem, it is advisable to equip production boards with an electronically readable ID. RFID has become ubiquitous since the introduction of the contactless payment system. RFID (Radio Frequency Identification) usually consists of a coil and a chip. The chip is supplied with voltage by the external generation of a pulsating magnetic field and can thus be read or written on. The advantage of this external power supply is that the RFID itself does not have a battery, which therefore does not need to be replaced. In this way, once a chip has been installed in a production board, it can remain in the board for its entire lifetime without needing to be accessed.

Even though this may sound simple at first, there are many issues that need to be considered. Great care must be taken in merely selecting the position of the RFID in a production board and the antenna in the system. For example, consideration has to be given to the extent to which the position of the chip changes when board turners or board buffer systems are in use. Manual movements usually also lead to a displacement.

It may only be possible to mount the antenna in one particular position (usually on the side or underneath the board) due to system or conveyor technology, thus limiting the positions for installing a chip in a production board. Complications can also arise, depending on the RFID installation situation and existing conveyor technology, if, for example, it is not possible to clearly distinguish which of two RFIDs is being read due to the small distance between two boards.
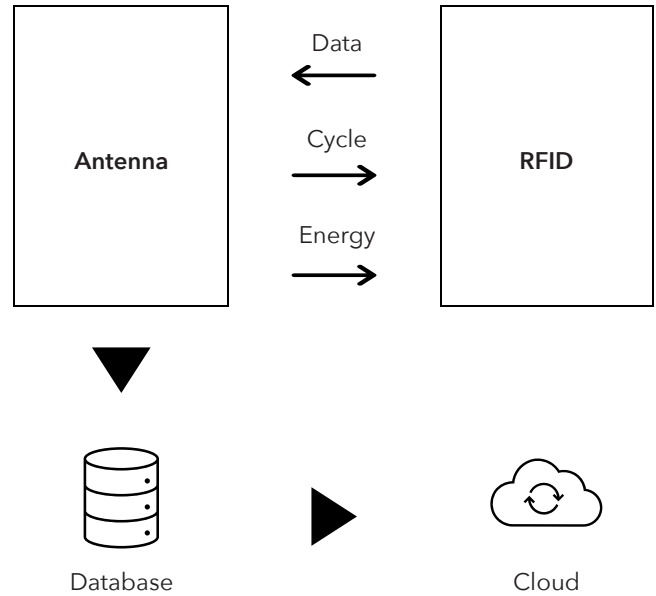
RFID Function Example

There are diverse RFID designs, which sometimes require a predefined positioning of the antenna. The largest possible area of the coil must be aligned parallel to the antenna to ensure the best possible transmission. For example, coin-shaped RFID can only be inserted horizontally into a board. The antenna has to be situated accordingly under the conveyor. Frequency ranges vary and are not necessarily shared internationally. Read/write cycles are limited and take time to carry out. It is thus usually advisable to store the data in a database instead of writing it to the chip. In this case, the RFID serves purely for identification and speeding up the process. The above mentioned points make it easy to see that various aspects need to be taken into account when it comes to RFID in production boards. Here, too, Wasa proves itself to be a customer and service-oriented company and is on hand as a competent partner, working together with various RFID types and diverse suppliers of sensor technology.

Together with the customer, Wasa determines which RFID type and what other hardware are most suitable and discusses the various installation and readout positions that come into consideration. The RFID can already be installed during manufacturing when new boards are purchased. For existing customers, the company provides advice and support when the new technology is to be retrofitted in existing boards. RFID can be installed in all board types that Wasa offers: from softwood boards to polyurethane-coated wooden boards to solid plastic boards reinforced with glass fibres.

Alongside the technical requirements for implementing Industry 4.0, Wasa also facilitates the evaluation of findings, thereby supporting its customers in increasing their efficiency. The data collected is, for example, able to indicate how boards were utilised. It is necessary to keep the boards

in regular use especially with materials such as softwood, in order to maintain a constant level of moisture and thus avoid damage that can result from their drying out.

The clear identification of a product – and thus the production board – remains the basis for diverse application possibilities and differing customer requirements. This opens up a multitude of new possibilities: increased production efficiency, quality assurance, production data processing in an ERP system, product tracking and, last but not least, possibilities for informing customers in digital form with a view to meeting increasing service requirements. An increasing number of customers are using open exchange with Wasa to shape their future more digitally. ∎

Different installation situations depending on RFID type