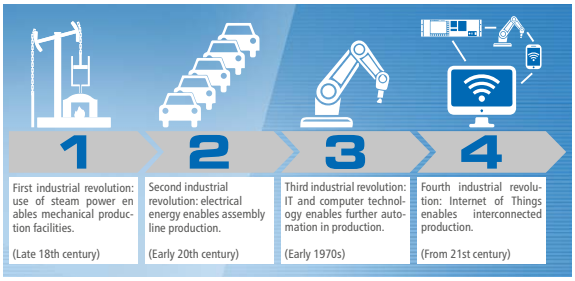
Industry 4.0

Introduction

These days, everyone's talking about Industry 4.0. Are we facing something unknown or unheard-of? In actual fact, the technologies involved in Industry 4.0 are well-known; the concepts are visionary but not new. Much ado about nothing?
Interconnecting physical objects with the virtual world using modern technology produces new working methods and business models that, set against current trends, are more evolutionary than revolutionary. The momentum surrounding Industry 4.0, however, should not be underestimated.
Equipping components and machinery with sensors and software makes it possible to acquire field data automatically. Interconnection means this data can be retrieved in near real-time and collated at a central point. What could previously be seen directly at the components and machinery on the shop floor can now be visualised and monitored using software on a single platform. The result is maximum transparency. All data is provided at application level, making it easy to see if there is a problem or deviation and then determine the exact nature of the problem or deviation. This enables considerably reduced response times.



The term Industry 4.0 or Industrial Internet refers to, the fourth paradigm shift in production, in which intelligent manufacturing technology is interconnected. The first three were mechanization (steam engine), electrification (conveyor belt), and computerization (programmable logic controller / PLC).
IoT: Internet of Things

Industry 4.0 at ZUMBACH

What does ZUMBACH offer its customers to address current challenges? ZUMBACH has recognised the importance of data to its customers, from acquiring, combining and displaying measured values from different instruments, via transmission of the data to a customer server, to the preparation of statistics and reports.

Industry 4.0 introduces further challenges, understood as follows by ZUMBACH:

- M2M communication (machine-to-machine communication) based on established standards
- M2H communication (machine-to-human communication) based on platform-independent display devices and standard software

In the field of M2M, customer fieldbuses are particularly supported, in compliance with standards and the measures required for certification. Beyond this, OPC UA integrated in USYS processors as well as in PROFILEMASTER®, STEELMASTER, RAYEX®, SIMAC® and others are available to customers (see separate OPC UA leaflet). Using the new OPC server gateway software, the majority of terminal devices can also receive data via OPC UA. OPC UA is a key element of Industry 4.0 and the Internet of Things (IoT). It enables horizontal and vertical integration across various levels of the automation pyramid, from the sensor to the ERP system.

Web server applications are the key priority in the M2H field; they are already offered in some systems today and will become universal in the future. In this context, too, OPC UA can form the basis for efficient M2H solutions thanks to common industrial interoperability standards.

Existing interfaces:

- **OPC UA** For the connection to SCADA, MES, ERP and others
- **Ethernet (Service)** USYS Web Server for the configuration and display of measured values

ZUMBACH software for the data management:

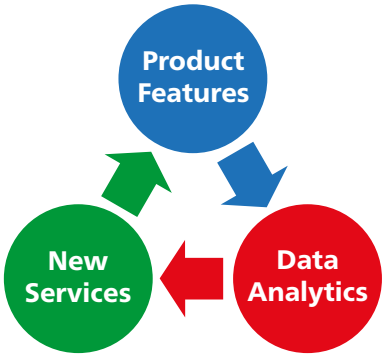
- **USYS Report Manager** For the storage of all printed reports, trends, SPC data
- **ODAC Manager** Windows™ based configuration and calibration of all ODAC® and ODEX® measuring heads
- **USYS Data Log** Direct raw data acquisition from all USYS processors and advanced analysis in Microsoft® Excel

The Industry 4.0 innovation cycle illustrates the concrete development process

The continuous process of developing an existing business toward new services in the Industrial Internet is illustrated by the Industry 4.0 innovation cycle. The innovation cycle comprises three phases that a company passes through in one continuous or parallel process.

"Product Features" phase

A product must be equipped with certain features for use in an Industry 4.0 environment. These include sensors, actuators, an information processing system and specific application software. In addition, the product must feature a network interface that can establish a wireless or wired network connection for the product in the field.



"Data Analytics" phase for knowledge acquisition

Alongside optimisation of existing services, access to machinery provides a way to collect a wide range of data. The data that is collected depends on the objective. The resulting data pool comprises both historical and current data and forms the basis for the next step: data analytics.
A multitude of sensors, components and machinery usually supply huge quantities of data, which today are subsumed under the term "big data".

"New Services" phase

New, useful services arise from the insights gained on the preceding data analysis.

Big data is a term for data sets so large, dynamic, or complex that they cannot be handled by traditional data processing applications. The definition provided by industry expert Doug Laney – which states that big data is characterized by the three Vs of volume, velocity, and variety – has become widely accepted by experts. The three Vs refer to the steady increases in data volumes, the high speeds at which data is transmitted (and, above all, generated), and the diverse formats in which data presents itself.

Volume, Velocity, Variety – the three Vs that define Big data.

Summary

The increasing interconnection of production and the internet is already extremely promising. Thanks to intelligent sensors and software that can process information, machinery and process data can be analysed to implement specific optimisation measures – preventive maintenance is just one example of the many possibilities for Industry 4.0 applications.

ZUMBACH is well aware of the challenges involved in supplying customers with suitable measuring, monitoring and control systems that are capable of realising the Industry 4.0 vision. By using recognised, advanced standards and working closely with customers, ZUMBACH wants to become a reliable, competent partner in the field of Industry 4.0.

WORLDWIDE CUSTOMER SERVICE AND SALES OFFICES

Headquarters:
Zumbach Electronic AG
PO Box
CH-2552 Orpund
SWITZERLAND
Tel.: +41 (0)32 356 04 00
sales@zumbach.ch

BELGIUM, sales@zumbach.be
BRAZIL, vendas@zumbach.com.br
CHINA P.R., sales@zumbach.com.cn
FRANCE, ventes@zumbach.com.fr
GERMANY, verkauf@zumbach.de
INDIA, sales@zumbachindia.com
ITALY, zumit@zumbach.it
SPAIN, gestion@zumbach.es
TAIWAN, zumfareast@giga.net.tw
UK, sales@zumbach.co.uk

North American Headquarters:
Zumbach Electronics Corp.
140 Kisco Avenue
Mount Kisco, NY 10549-1407
Phone +1 914 241 7080
USA
sales@zumbach.com

www.zumbach.com

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