ON THE ROAD TO THE SMART FACTORY

Cyber-physical Systems, the Internet of Things and Today's Production Environment

FUTURE CONCEPTS of cyber-physical systems and the Internet of Things in production involve discussions of fully networked, self-organizing production systems which have the objective of a "Smart Factory". These are also an important part of the high-tech strategy, Industry 4.0. However, until we reach the objective of completely digital manufacturing, there is still a great deal of research and development ahead. The networking of sensors and actuators via the internet means that with our current level of technology, we still face unanswered questions such as real-time compatibility and security, which are needed in an industrial context.

However we do not necessarily need to consider the concepts of the Internet of Things (IoT) as the prospect for the future. Nowadays, with hybrid architectures, we can already increase previously-unexploited potential in resource efficiency, effectiveness and flexibility in manufacturing. As long as network infrastructures and protocols do not allow real-time-capable processes via the internet, we will work with architectures that function with a "division of labor" – both decentralized and central intelligence. And because humans will continue to play a significant and increasingly important role in production for the foreseeable future, the continuous improvement of ergonomics and thus a reduction in employee efforts is also an important factor in production.

The Internet of Things is now present in virtually all areas of life and work – from fitness wrist bands that communicate with the cloud, to parking sensors that provide information for higher-level parking guidance systems. But what is the significance of the IoT in production?

The journey to the digital factory will be, as with so many developments in industrial manufacturing, a continuous evolution rather than a revolution. Existing heterogenic production equipment, long investment cycles and limited possibilities for "experimenting with ongoing production" are the typical prevailing conditions.

Let's consider the way to the Smart Factory as a journey that started over 40 years ago with the invention of the programmable logic controller (PLC). With a little imagination, it is also possible to consider PC-based automation as an intermediate step to the digital factory.

For a long time, the reliable control of industrial processes was considered the main task of automation. In order to be able to produce more intelligently, focus on a consistent flow of information assumes greater significance in addition to the control aspect. If we manage to establish this and control it, we can set up applications and logics with it, which in turn allow us to save resources, become more effective and produce more flexibly.

However, if the technology is (in part) still in development – what concrete steps can we take in order to make our manufacturing "smarter" today?

SEVEN STEPS TOWARDS A SMART FACTORY

1. BRING PEOPLE TOGETHER

One of the biggest challenges at the moment is not technological, but organizational. We need to bring the people who look at the company's objectives – what do we want, what can we do; when, how and to whom do we sell it; and why? – at the table with those who know what is technologically possible. This requires cross-discipline teams in which representatives from the areas of production (including automation), IT, marketing and sales, as well as supply chain management, can contribute.

2. FIND A COMMON LANGUAGE

The Internet of Things, cyber-physical systems, PLCs, information flows, ergonomics, business processes, total cost of ownership, return on investment, investment cycles … there is the risk that we all lose ourselves in babylonic linguistic confusion before the discussion has even started.

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This is why we should concentrate on the actual problems that we would like to have solved and we attempt to leave out technological or business jargon.

3. DEFINE BUSINESS OBJECTIVES

People who are technology enthusiasts are often subject to the temptation of concentrating on what is technologically feasible or what is not yet feasible but could become feasible. If we see technology as a lever, used to better fulfill the purpose of the company, the business objectives should be the main focus. Such questions and similar ones could help to shape the discussion: can we acquire additional customer groups if we were to produce with more flexibility? What costs (for energy, raw materials etc.) present a risk for our business model? What should our production be able to do in order to make our customers happier and more loyal? What can differentiate us from the competition in the future?

4. DETERMINE THE IDEAL STATUS

If the business objective we wish to achieve is clear, it is possible to work out what the intended ideal status would be. An energy-autonomous factory? Product customization down to a "batch size of 1"? Shorter cycles from product design to delivery?

5. COST/BENEFIT ASSESSMENT/INVESTMENT PLAN

If the business objective we wish to achieve is clear, it is also possible to estimate what additional profit we can expect from it as a result. This will also define, taking into account the risk, how much we want to invest in order to get closer, step by step, to the ideal status.

6. MATCH TECHNOLOGIES, TAKING INTO ACCOUNT COSTS AND BENEFITS

With the knowledge of what we actually need, of where the journey will take us, and the investment framework, we can evaluate how close we can get to the ideal state with the technology that is available today. With the background of the results from steps 1-5, we will in many cases be positively surprised at how much can already be implemented today. As a side effect, it also becomes clear which technologies are still missing in which areas, in order to take the next steps.

7. IMPLEMENTATION AND CONTINUOUS IMPROVEMENT

In this step, we return to the usual routine and look into the implementation, integration and continuous improvement of the previously-defined measures. With regard to "continuous improvement": if you are ready, go back to step 1 now!

We would be happy to move towards a Smart Factory together with you and are available as a discussion partner, advisor and technology provider.

PHILLIP WERR
MARKETING MANAGER

COPA-DATA TECHNOLOGIES FOR THE JOURNEY TO A SMART FACTORY

CONNECTIVITY
manufacturer-independent connectivity for the networking of heterogeneous production landscapes.

INTELLIGENCE FROM THE EMBEDDED DEVICE TO THE PC UP TO THE CLOUD
with straton and zenon Logic, the IEC 61131-3 development environment and Runtime. Can run on microcontrollers, PCs and in the cloud.

M2M COMMUNICATION
with "straton binding", we offer a powerful protocol for horizontal communication at machine level.

FLEXIBLE VERTICAL PLACING OF INTELLIGENCE
with the components straton, zenon Logic, zenon and Batch Control, flexible architectures can be implemented as required.

CLOUD INTEGRATION
for data used across sites and computationally-intensive applications.

SECURITY/SAFETY
integrated security and safety technologies and design concepts in order to fulfill networked production requirements.