

White Paper

IIoT

Challenges and benefits



Introduction

Old ideas presented in a new way or an industry defining advancement?

Almost every day we are bombarded with information about industry 4.0, IoT, IIoT, digitalization and so much more in trade journals, newsletters, white papers and on the news. Everything seems possible! Anyone who doesn't know about the latest trends is quickly considered old-fashioned. However, if you look behind the scenes, you will also find that many of the latest "fads" presented today were already hot topics around the turn of the millennium. This raises the question: Are these just old ideas being presented in a new way or is there really an new innovation trend?



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I. Taking a look back

At the turn of the millennium, there were many self-sufficient systems with strict hierarchies. In machines: sensor and actuator signals were connected to terminal blocks in the control cabinet and then to the input and output channels of the controller. This involved a lot of time spent wiring and increased the risk of errors. In the next step, the signals went to fieldbus modules, which were located either in terminal boxes or – if they had a high IP rating – directly onto the machine. They were connected to the machine control via the bus system. A few years later, the time of Ethernet-based systems began. The benefits of these solutions were obvious: reduced cabling costs, easy expandability and a reduced risk of errors. Some systems even offered users diagnostic functions, even though they were rarely used to their full extent.

With all these changes, the machine control system remained the central point where all signals and information converged. The information was collected incurred the following results: the more extensively the data was collected, the more this negatively affected the performance of the controls. This was offset by powerful control systems or information and signals were further processed via specific interfaces such as MES systems. However, this was costly. The data was stored on the users' servers, external connections were rarely available. This had the disadvantage that data could not be accessed via mobile devices (as is the case today), but it did have the advantage that security issues were reduced to internal breaches and were easier to solve. There were smart electrical engineers who, as early as the 1990s, installed a 56k modem in every machine for service purposes. During a machine shutdown, the customer could decide – with all the advantages and disadvantages – whether to plug the modem into the telephone socket or to give the machine builder access to a self-contained machine via a specific channel or not.

II. And today?

Everything can be networked with and among each other. It seems the user's benefit should be much more obvious! But far from it; all the buzzwords generated in the media pose immense challenges for all companies, especially for small and medium-sized mechanical engineering companies. They must continue to maintain their competitive advantage: the design and development of sustainable machines. In addition, they must, however, also keep up with the trends digitalization and decide if they can use them profitably, for example in the form of new business models.

There is no doubt that digitalization will make its way into mechanical engineering – if only because humans are creatures of habit. Services from the B2C industry are undoubtedly penetrating the industry. Today's students, who will be the future decision-makers, will be even less inclined to do without the things they are used to from everyday life.

A challenge is the convergence of IT (information technology) and OT (operational technology). Mechanical engineering companies are confronted with many classic IT issues. The IT experts have only a few resources available to take on additional tasks. This means that the giant task of ushering technological change must be mastered under the premise of a shortage of skilled workers.



This juxtaposition poses the question:

if there are so many IT groups and control manufacturers dealing with this complex topic, what contribution can Murrelektronik make?

One of Murrelektronik's success factors has (always) been the development of products that bring benefits and create added value. Conversations with our customers reveal that many also want pragmatic solutions when it comes to IIoT. Digitalization should not serve the purpose of just being on trend but should bring benefits and added value. The big solutions are not always worth striving for because digitalization is characterized by uncertainty. When is the right time to invest in a technology? Maybe tomorrow there will be an even better technology? Have all requirements really been taken into account? Have security issues been sufficiently considered? Is the solution safe and sustainable? It's often better to start and gain experience: small solutions or concepts can be implemented quickly and lead to success! And success is a motivating factor.

At one industry event, the audience was asked what they understood under digitalization. The slogan "the optimization of processes and procedures" was popular because it underlines the benefits of digitalization so clearly. New business models, such as the renting machines, can also be incorporated. It is interesting to note that new target groups are becoming increasingly important in the dialogue about processes and procedures. Suddenly this becomes interesting for process and production managers. Some companies even have departments for Kaizen or process optimization.

III. Big data vs. smart data

Before going into too much detail, the terms "big data" and "smart data" should be precisely defined. More data offers more insights. It is, however, also clear that more data means increased costs for storage, management, and archiving. A practical example: A small application with many data points generated half a million data positions within a short time, all of which were stored in an ERP system. Because the load on the system would have become too great over the medium term and there was a risk of a slowdown, it was agreed to outsource the data from this system again. The euphoria of the first IIoT project had already given way to a sober consideration of the benefits. The following questions came into focus: What data is actually needed – and does this correspond to the investment? More doesn't mean more, or in the words of a typical finance manager: "Controlling only brings something as long as it does not exceed the effort."

Murrelektronik is committed to the Smart Data Approach. We ask ourselves: How can the amount of information be chosen so that it is equally small but sufficient and does not burden the controls. In addition, the solution must be secure, able to be implemented in a short time without expert IT knowledge, and with little time and material input.

The goal:

rapid implementation and visible success.

A distinction must be made between applications in new machines and already existing machines. Machines have run times that range from a few years to decades. For machines with long life cycles, an update can make sense to bring processes up to date. A retrofit in electrical engineering is the perfect opportunity to implement new technologies, as this is equivalent to building a new machine in terms of electrical engineering. Adapting new technologies would more difficult without a retrofit. It doesn't make sense to interfere with a running system, because changes could lead to a load on the control system and thus put the entire machine performance into question. Information could be run in parallel, past the control. However, this sounds easier said than done. In addition to the additional wiring (which is usually feasible), sensor information may also have to be built up in parallel. For example, how do you get the information that a light curtain has been contaminated? You can't wire the sensor twice.

The simplest answer, but possibly the one with the highest expectations, is to build up new machinery and equipment.



IV. The Cube67 Diagnostic Gateway

For all machines and plants that are equipped with the modular fieldbus system Cube67, there is a simple option, the Cube67 Diagnostic Gateway. It can be implemented between the cables of the fieldbus module and its expansion modules, either in general or during maintenance. The procedure is simple: Mount the Cube67 Diagnostic Gateway, connect the cables from the fieldbus module to the Cube67 Diagnostic Gateway, plug four connecting cables to the fieldbus node – finished! The Cube67 Diagnostic Gateway picks up all process and diagnostic data of the modular fieldbus system and makes them available on an electrically isolated interface via OPC-UA, without overloading the controller. The user can then choose which information is relevant for the task. This has the benefit of pre-processing. The data can be processed in MES systems, for example.

If you want to use the data on the go, you can install the cloud interface nexogate from Murrelektronik. This makes it possible to make data globally available via mobiles without having to resort to IT resources (although it is always advisable to involve the IT department if data from the company is outsourced). The data is transferred from the cloud interface nexogate to the customer area of the Murrelektronik cloud and is available there for the user (and only for the user). But is the data also secure and what is the benefit?

As previously mentioned, a solution must be implementable without IT expertise, be secure – and provide the customer benefits.



V. Customized dashboards for different users

In the Murrelektronik cloud, every customer receives their own locked area to which only they have access. They can decide what they want to do with the data and who (and in which form) should have access to which information. No special software is required to view the data, only a standard browser that is capable of the latest encryption technologies. This works on smartphones, tablets and PCs. Customized dashboards can be generated in minutes for different users with different information. The customer manages the accesses of their area and thus the users themselves. Alternatively, data can be made available to other systems via an API interface.

Each nexogate is already coupled with the customer area in the cloud at delivery. This eliminates the usual onboarding process on the customer side, which avoids errors. Via an integrated eSIM with an untethered roaming contract, nexogate machines can be operated in around 180 countries around the world. nexogate automatically selects one of around 400 mobile phone providers. If there are several available, the one with the strongest signal level is automatically selected. If a mobile phone signal fails, the system automatically switches to another provider. This enables mobile use and guarantees the availability of the system. For the user, there is no need to sign mobile phone contracts and search for providers. This is particularly advantageous if you could only sign a mobile phone contract in one country, but you have a local company headquarters. This eliminates a lot of organizational effort, and you can still offer global services and obtain data from the machines at manageable costs. The data transfer between the nexogate cloud interface and the Murrelektronik cloud customer area is encrypted according to the AES256 standard. This also almost solves the question of security. Only one last point is still missing: Everyone knows the problem of hacker attacks. They can occur when vulnerabilities in secure technologies are detected. It may therefore become necessary to send nexogate a security update in due course. However, this is as easy as security updates can be activated from the cloud. There is no need to be on site, and there is no need to stop the machine. This avoids expensive travel costs.

Your next question must be: Does nexogate enable outside influences on the machine? The answer is no. How does it deal with questions of machine security? All data is transferred from the machine to the cloud in one direction only. There's no bi-directional communication, therefore no way back. Only the security update can find its way into the nexogate.

nexogate is explicitly designed for small data volumes. But are small quantities enough? Yes! Just think about what can be read from six pieces of information from a machine light: Off, standby, set-up mode, material shortage, productive operation and malfunction. Currently, these statuses are only visually visible on the machine. However, if this tiny information is provided with a time stamp and made available in the Murrelektronik cloud, it is possible, for example, to evaluate how long a machine was productive. That way, the person responsible for production can get an overview of their shop floor. For the machine manufacturer, the pay-per-use business model makes it feasible. It can also be helpful for production control to know whether material shortages have occurred during breaks. In the event of a malfunction, maintenance personnel can be automatically called to the machine by email via the Murrelektronik cloud; regardless of whether they are an internal team or external partners. The called upon party can (or must, depending on the setting) acknowledge that it has accepted the failure; alternatively, the next employee in the alarm chain can be called sequentially or in parallel. The system is proactive, which means it responds independently with an e-mail or SMS, the information does not need to be requested. Not only the data from Murrelektronik products is communicated via nexogate, but also all other information that would otherwise find its way to the controller.



VI. Promising success in a short time

This is only a small excerpt of the possibilities and benefits that already exist from smart data approaches. Now it is time to seize these opportunities, to start simply, without any IT expert knowledge, with a small investment, but with the prospect of promising success in a short time.

VII. Exclusion of liability

The data provided does always not claim to be complete and up-to-date. Murrelektronik GmbH does not guarantee the accuracy of the information. We reserve the right to make changes or updates at any time and without prior notice. Any changes and misuse of the information provided are prohibited.

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About Murrelektronik

Murrelektronik is an international, family-run company in the automation technology sector with more than 2,700 employees. The vision and mission of Murrelektronik is to optimize machinery and plant installations and thus generate a competitive edge for its customers. Decentralization is the company's speciality: the control layer of machinery and plant is optimally connected to the sensor-

actuator layer with proven concepts and innovative technologies. Close customer cooperation is vital to develop customized solutions for optimum machine installation. High product availability rounds off the Murrelektronik portfolio and the customer experience.