E-BOOK
BENEFITS OF RETROFIT

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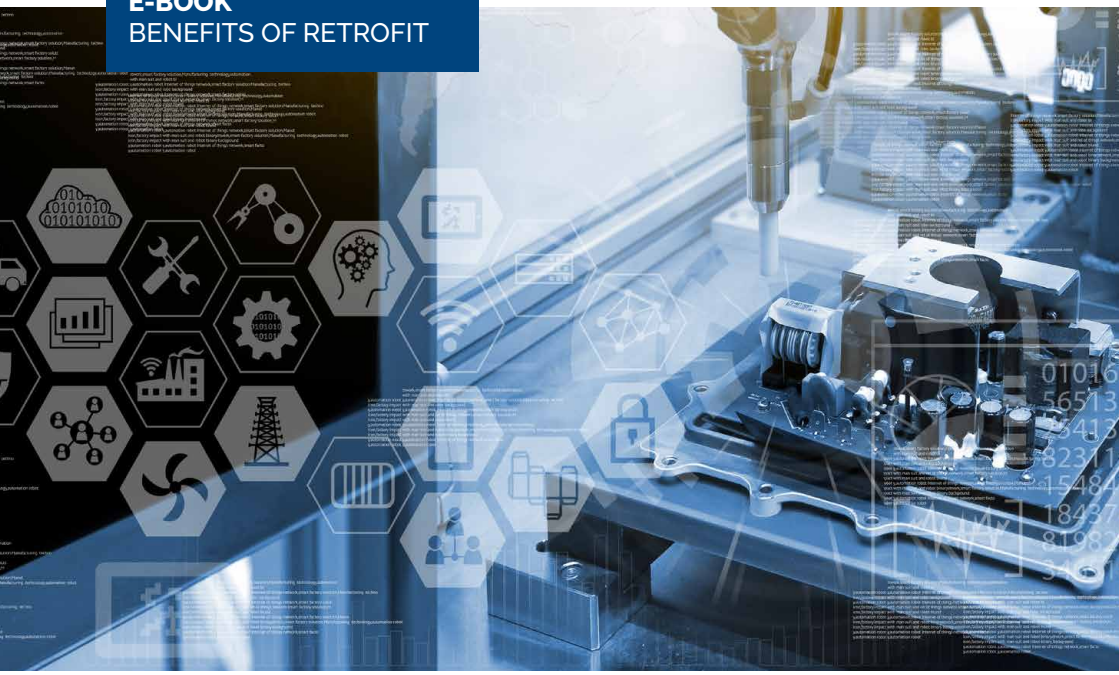


(RETRO)FIT FOR MACHINERY 4.0

“Industry 4.0” is a concept that has come up in almost every debate on the economic future of manufacturing companies in recent years.

Huge hopes are associated with the technology, its potential seems enormous. At least, numerous studies come to this conclusion. In reality, that is, at the companies themselves, the topic is discussed somewhat more cautiously. After all, what are the benefits of a futuristic vision of smart factories where cyber-physical systems are controlling themselves autonomously, if the actual aim is to increase the performance of machines and systems in order to survive in the face of ever tougher competition?

There are, in fact, a lot. Because such a vision impressively demonstrates what might be possible with innovative technologies. Even if not all of it can be realised today, the digitalisation of manufacturing can already have an extremely positive effect right now: by providing more transparency, by increasing the effectiveness, efficiency and flexibility of existing processes and by enabling new use cases. As we will show in three examples.

COMPLETE TRANSPARENCY, PREDICTIVE MAINTENANCE AND TRACEABILITY

The performance of a production can be made clear by a key figure called overall equipment effectiveness (OEE). It determines the performance of machines and plants from three parameters: availability, performance and quality. The higher each of the three parameters, the higher the overall equipment effectiveness of a plant and the higher the economic success it contributes to. If companies want to improve continuously, it will thus be useful to regularly determine the OEE values for all assets in the workshop. In fact, it is the only way to determine if and how any optimisation measures are having an effect at all. This complete transparency can only be achieved—at least with a realistic effort—if the entire process runs digitally. That is, only if all machines and systems record performance data and transfer it to a higher-level system—usually a Manufacturing Execution System (MES)—where it is processed automatically.

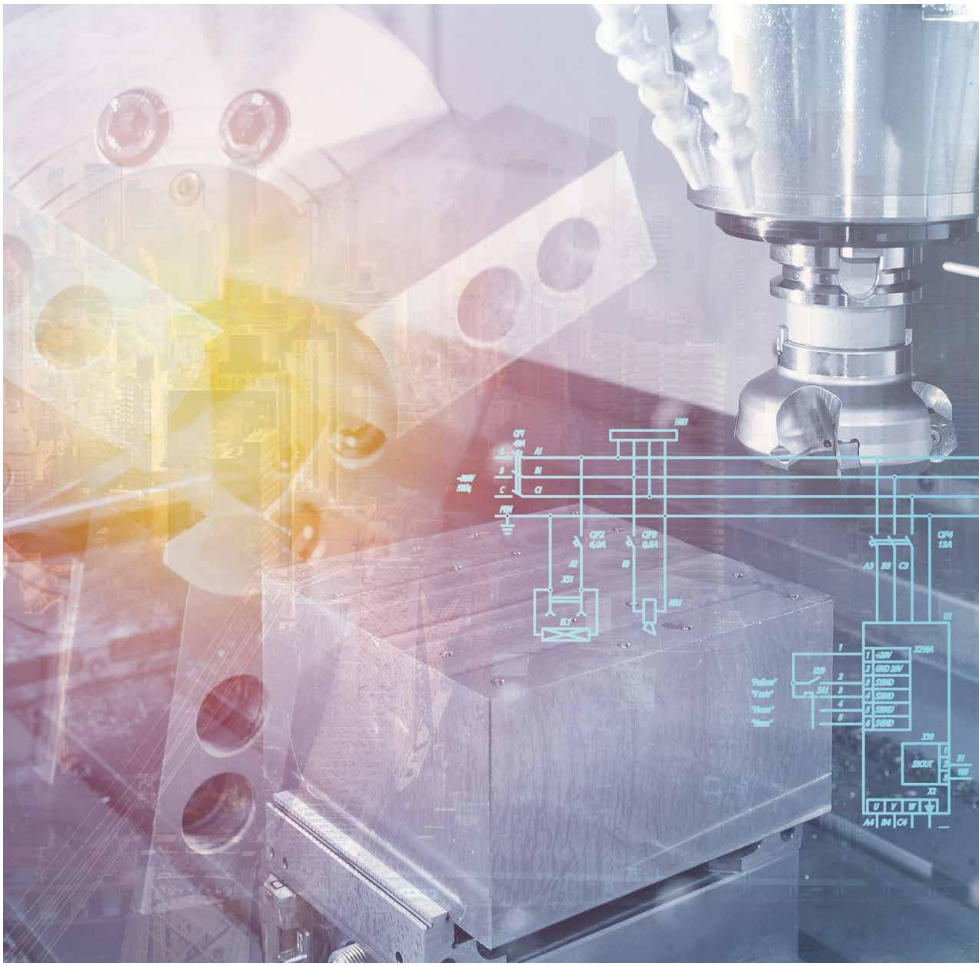
If the current condition of machines and plants is made transparent, this provides additional advantages. Such as condition monitoring. Machine data is evaluated in real time to continuously monitor the situation on the shop floor. The current status is then displayed graphically, for example on a PC, a smartphone or on large screens in the workshop. If defined limits are undercut or exceeded, the system can additionally signal this with an acoustic or optical alarm. Predictive maintenance goes one step further: With predictive maintenance, the data from a machine or system is constantly analysed in order to forecast future malfunctions. This gives companies the opportunity to carry out maintenance measures in good time—ideally at a time when the maintenance does not affect production. As a result, the number of unplanned downtimes is reduced, the availability of assets increases and therefore the overall equipment effectiveness increases.

Ensuring that production is as effective and efficient as possible is an important task for all companies. Some companies additionally need or want to ensure complete traceability. In concrete terms, this means that the entire production process must be traceable for every product produced. Which feedstock materials, preliminary products and parts were used? Which machines and systems were used? How exactly did these machines and systems work—what was the temperature during gluing, for example, or the pressure during pressing? In some cases, companies are legally required to provide traceability—when manufacturing medical devices, for instance. In other cases, it is the customer who demands traceability—car manufacturers often demand this procedure from their suppliers. Finally, some companies voluntarily opt for traceability to protect themselves against possible third-party claims. Whatever the reason may be: in order to achieve complete traceability, data must constantly be recorded and documented along the entire manufacturing process. In principle, this could even be done manually. However, human errors can hardly be ruled out, and the effort would be overwhelming. Achieving the goal becomes much more streamlined and reliable when data is collected and processed digitally.

RETROFIT AS A BASIS FOR DIGITALISATION

Numerous other scenarios could be added to show how the digitalisation of production processes leads to considerable benefits. However, machines and plants first need to be able to capture real events and conditions through analogue sensors, then to convert this information into digital data and finally to pass them on to a higher-level system for this to work. Modern assets are usually factory-equipped with the necessary sensors. However, the machinery often does not only consist of brand-new machines and equipment, but also of hardware from the last decades. It would not be uncommon for some very special machines to still date from the 1970s. Most of the machines and equipment found in today's production plants were purchased sometime in the early 2000s. Back then, these assets already had undergone a development phase of about five years—in other words, they were based on technology from the turn of the millennium. Computers still accessed the Internet via dial-up modems at the time. Mobile phones were used to make phone calls and send and receive SMS messages, and that was that. Production environments are therefore quite heterogeneous and only a fraction of all machines and systems are already equipped for digitalisation. If the entire production is to be digitalised, the individual assets must be brought up to date with additional components. We call this approach a "digital retrofit".

Retrofitting basically covers all activities through which older machines and systems are extended by new components to upgrade them. If you install a more efficient motor or a new linear axis, this is a retrofit. In our experience, however, the greatest potential in the face of the accelerating digital transformation lies in additional digital retrofit measures that integrate assets on the shop floor into digital processes.



REASONS FOR A DIGITAL RETROFIT

- A retrofit creates the basis for the digitalisation of your production by integrating machines and systems into digital processes.
- A retrofit enables new, digital scenarios that bring more transparency and an increased effectiveness, efficiency and flexibility to processes and allows for new, innovative use cases.
- A retrofit guarantees investment security because you can continue to use existing machines and systems.
- A retrofit is much more cost-effective than buying a replacement.
- A retrofit contributes to a longer machine service life through permanent condition monitoring and improved maintenance intervals with an optimised spare parts supply.

INTEGRATION IS KEY

In this context, a retrofit comprises much more than just retrofitting some components—mostly sensors—to machines and systems. After all, the data must not only be recorded, but also processed in a meaningful way. A retrofit aimed at digitalising your production is thus about integrating the assets into a digital production process.

On the one hand, this requires a technological infrastructure that enables and organises an unimpeded flow of data, from machines and systems to network components and further to software that can evaluate the data. On the other hand, you will need a well-thought out integration concept that defines which data is to be recorded and how it is to be used. The true art of digital retrofitting therefore lies in knowing how to select and combine all individual components in such a way that the greatest benefit for the company arises out of their seamless interplay.

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