

THE DIGITAL FACTORY

The perfect marriage of
hardware and software

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THE DIGITAL FACTORY: THE PERFECT MARRIAGE OF HARDWARE AND SOFTWARE

The 21st century is the age of digitisation. Software connects the world, hardware will act independently. Equipment, machines and even entire factories are becoming smart. In this whitepaper you'll find out what a digital factory is, which benefits it brings and how you can digitalise your factory.

Imagine this. You own a factory. One of your major customers is in the offshore industry which operates 24/7, and where each delay is costly. If a part breaks on a manufacturing platform, it's crucial to arrange a quick replacement. That's exactly why they're so happy to work with you. If your customer requires a replacement component, they can immediately log into your system via a portal and indicate exactly what they need. Once the order is final, machines start to manufacture the specific part required by the customer, regardless of the time of day.

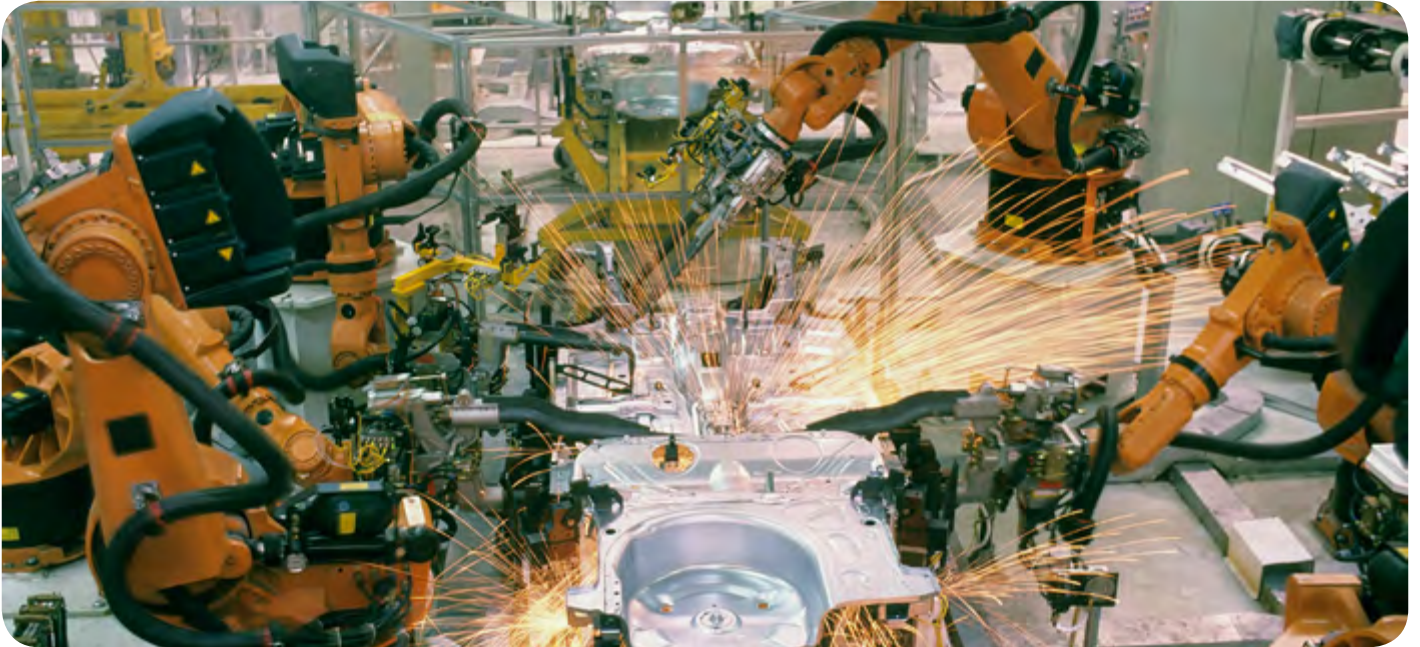
This scenario isn't science fiction. It is technically possible to design your manufacturing process this way these days. Based on [research in the manufacturing sector](#), Capgemini expects the manufacturing sector to work 27% more efficiently by the end of 2022 thanks to the advent of digital factories. In the words of [Ineke Dezentjé](#), chairperson of the employers' organisation FME-CWM and ambassador of Smart Industry: "Today you're a manufacturing company, tomorrow an IT company."

Welcome to the digital factory

The scenario above is a typical example of a digital factory; a fully automated manufacturing environment with a flexible assembly line. Don't be put off by the word 'digital': it still involves a physical building where real machines manufacture real products. The less well known term Cyber Physical Factory would perhaps be a more apt phrase; in the factory, computer systems (cyber) and physical processes (physical) are entirely linked.

The digital component in these factories is the control of the machines. Humans are scarcely required for this- it's all taken care of by software. Everything is automated. It starts with logging the manufacturing order and runs via the implementation of the manufacturing plan to the processing and delivery of the end product.

This requires the hardware in a factory – the machines and manufacturing robots – to 'think' independently to a certain extent. Or at least to be able to process digital input and convert it into action. For this, it's essential that all information is available from a solid core system at all times, containing all data regarding customers, suppliers, inventory, products, etc.



Finally, the staff – necessary even in a digital factory – are required to shun offline communication. No island-automation or paperwork exists within the walls of the digital factory. After all, this undermines the status of *single source of truth* of your ERP system. This also applies to all contact with suppliers and naturally also customers.

The digital customer is king

A digital factory is not tied to a 40-hour working week. The entire manufacturing process becomes independent of working days, weekends and holidays. As long as there is input and material, the factory can manufacture. If an order arrives in the middle of the night via the web store from an overseas customer, nothing in the factory prevents an immediate start of manufacturing. And when you arrive in the morning, the ordered products are already coming off the conveyor belt – without you even knowing that the order was placed.

This is great news for your customers. They see a significant reduction in manufacturing times, which means they don't have to wait as long for their products. This allows you to meet their every need, because customers increasingly expect tailor-made as opposed to mass manufactured products. They want to be able to define their own products. The digital factory allows you to be a forerunner with this: you supply tailor-made work for the price and delivery times of mass manufactured products.

Short delivery times aren't just a matter of night-time factory operation but also of shorter manufacturing distances. After all, modern technology means that it isn't necessarily cheaper to manufacture in low income countries. The digital factory allows Western countries to be more competitive in the manufacturing world.

THIS TECHNOLOGY CAN BE FOUND IN A DIGITAL FACTORY

Big data

The term big data involves the analysis of (large amounts of) data. Data analysis supplies the fuel for many other technologies, such as Artificial Intelligence and Machine Learning and therefore for every 'smart' device.

Internet of Things (IoT)

The Internet of Things means that devices communicate with each other. To do this, they must be equipped with sensors, a power source and a network connection. [Read more about IoT](#) on our technology blog.

OPC UA

In a digital factory, machines not only have to be able to communicate with each other, but especially also with the ERP system, from which they receive their input. There is a standardised communication protocol for this: Open Platform Communications Unified Architecture (OPC UA). [Read more about OPC UA](#) on our technology blog.

Robotics

Manufacturing robots are becoming ever smarter. Equipping them with sensors and supplying them with data allows them to learn new things, respond to their environment and switch between tasks. This means that robots are no longer only suitable for mass manufacturing, but can be deployed in a much more flexible way. [Read more about robotics](#) on our technology blog.

3D printing

Why would you keep a large stock of parts – or risk delaying your manufacturing because you have to order them – if you have the option to print them when you need them? By using a 3D printer, you can manufacture exactly what you need, when you need it. Fast, flexible and at far lower costs!



EXACT'S DIGITAL TEST FACTORY

Exact is building a test environment for a digital factory in Delft with Festo, who are German specialists in industrial automation. Everything is automated in the demonstration factory, from logging sales and manufacturing orders to the actual manufacturing and administration of the end product in the inventory system. The entire process is controlled digitally, without any human action required. This makes the digital factory of Exact and Festo the first of its kind in the Netherlands.

How do you make an 'analogue' factory digital?

Will you have missed the boat if you don't have a 100% digital factory by the end of the year? Not quite, but procrastination and unwillingness to move forward aren't a good idea. Expectations are that by the end of 2022, [21% of factories will be 'smart'](#). It will become increasingly harder for 'analogue' factories to compete with modern, digital factories. So it's advisable to aim for the perfect digital factory in the future, and to proceed in that direction step by step.

Because the manufacturing environment is unique, there is no off the shelf *one size fits all* process. There are, however, best practices and shining examples. Using the following case studies of Exact customers you can gain inspiration and specific ideas which are relevant to you.

BONFIX: Digitisation of the warehouse

Out-of-warehouse suppliers will recognise this trend: an increasing number of orders are placed, but they are becoming smaller in size. Customers want to keep a smaller inventory and are thus ordering smaller

amounts. Subsequently they expect you to deliver fast and completely. As a supplier for the installation sector, BONFIX started using smart hand scanners and order carts to make picking orders even more efficient.

The BONFIX scanners receive their input directly from Exact WMS. Order pickers see orders appear on the display, including the most logical route through the warehouse. They walk to the first location, scan the article so the system can check it's the right one (or provide an error notification if it's not). The order picker can collect multiple orders simultaneously. A smart order cart, equipped with displays and a simple RaspBerry-Pi minicomputer, states which product goes with which order, to prevent errors.

The BONFIX order pickers can now collect up to 8 orders at a time, which makes them, on average, twice as productive as before. This now allows BONFIX to promise customers they'll have their orders delivered before 4 p.m. the next working day, and rush orders within only 4 hours. They achieve a delivery accuracy of 99.8% and only have 0.01% stock discrepancy.



Kamp Coating: Identification of individual products

Kamp Coating is the market leader in the powder coating of metal products. This is tailor-made work, where every product has specific manufacturing and assembly instructions. The fact that each product can be identified through barcoding means that the powder sprayers can easily check the drawing and all associated specifications. This allows Kamp Coating to work efficiently, prevent errors and minimise the use of coating material. When products are reported as being ready on the line, the customer immediately receives a notification of when they can collect their products.

Valk Welding: On demand manufacturing

As a manufacturer of industrial welding robots, Valk Welding has a high-tech and modern product. What's more, the way the company has designed its own processes and business operation is forward-thinking. They discovered that their welding robots can also be used to make 3D prints by placing welding seams on top of each other. This is how Valk Welding began 3D printing metal spare parts for offshore customers, for example. This innovative way of working

was developed further and was realised in RAMLAB. The robots can be programmed for the next job while working on the first, meaning they are highly productive. They receive their information by being connected to the central company database. Thanks to this collaboration between software and hardware - the optimal digital factory - the company is able to rapidly provide customers with essential components without having to hold a large inventory.

Agrifac: fast benchmark thanks to data analysis

As a large manufacturer of agricultural machines, including crop sprayers, Agrifac Machinery has many farmers as customers. Agrifac is able to collect user data by equipping its machines with sensors. This data is then used to conduct analyses, which are then used to advise their customers. If it transpires that a certain customer has used significantly more spray liquids than other customers in comparable conditions for instance, Agrifac can inform them about this, and offer advice. This service leads to lower costs for the farmer and allows Agrifac to add more value as a supplier of agricultural machines.

SUMMARY

A digital factory is a manufacturing environment in which software and hardware work together seamlessly. The control of the manufacturing process is digital; paper information exchange is a thing of the past. A solid core system is essential to control the entire process centrally. This includes all data concerning customers, suppliers, inventory, products, etc.

Manufacturing in this way helps you respond to increasing customer demand for the faster, more frequent and custom-made supply of products. A digital factory offers tailor-made work for the price and delivery times of mass manufactured products.

Exact builds business software for SMEs and their accountants. Our innovative technology is aimed at specific business needs, providing an overview of today and insights into the opportunities of tomorrow.

Exact inspires businesses to grow. Our 1,600 employees love, share and support our customers' ambition. Like them, we aim high. Like them, we aspire to lead the way. That's how we know it's a bumpy road to success. And that's why we build software to help smooth it out, enabling our customers from all over the world to grow.

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