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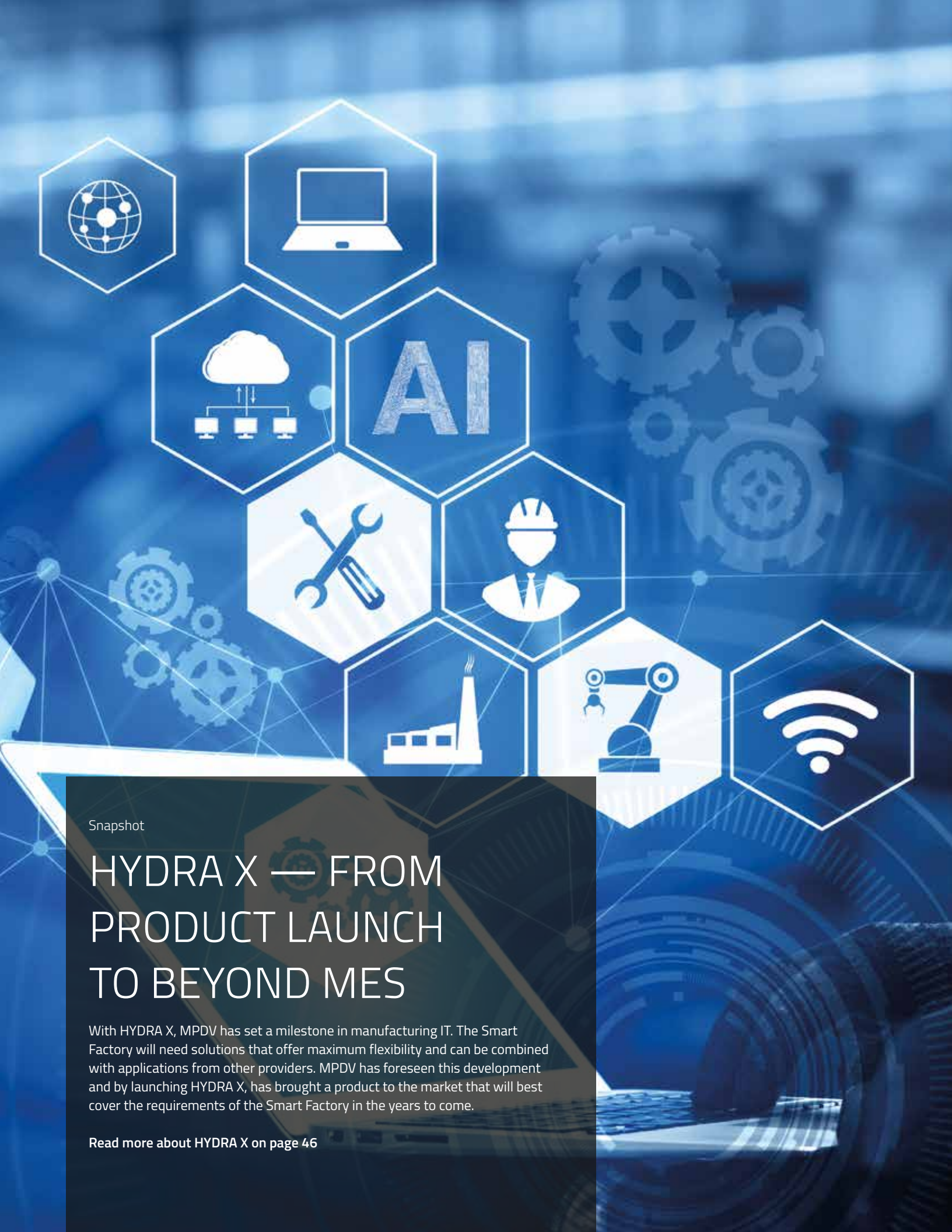
MPDV NEWS

Edition 2022

MPDV
Success Factor
Platform & Ecosystem

FELTEN
Digitalization In
The Process Industry

PERFECT PRODUCTION
The Role Of People In
The Factory Of The Future



Snapshot

HYDRA X — FROM PRODUCT LAUNCH TO BEYOND MES

With HYDRA X, MPDV has set a milestone in manufacturing IT. The Smart Factory will need solutions that offer maximum flexibility and can be combined with applications from other providers. MPDV has foreseen this development and by launching HYDRA X, has brought a product to the market that will best cover the requirements of the Smart Factory in the years to come.

Read more about HYDRA X on page 46

Snapshot

PRODUCTION PLANNING: EASIER THAN EVER

With the new version of the APS FEDRA planning solution, multi-site planning is now possible for several systems and locations. A number of technical optimizations have also been made and customer requirements incorporated. You will find out in the interview how APS FEDRA 2 supports companies of all sizes and from all industries.

Read more about APS FEDRA 2 on page 74

Snapshot

LONG LIVE THE ECOSYSTEM!

The platforms most frequently used in production are IoT platforms. These platforms are used to collect, store and evaluate large amounts of data — but that wasn't enough for MPDV. The difference to the Manufacturing Integration Platform (MIP) is reflected not only in name. What is so special about the MIP?

Read more about the MIP on page 64

EDITORIAL

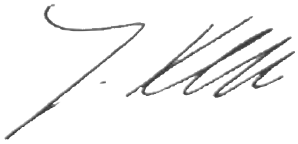
Dear Reader,

Disruption or transformation, revolution or evolution, people or machine? The experience of the past years has shown that there is not one or the other. In many cases, a carefully chosen compromise leads to success. A gradual but consistent further development that keeps people in mind. It's still people who orchestrate production while machines and IT systems take over tasks they can do better.

But apart from the central question of the role of people, there are other issues that concern us and the industry. That's why we have compiled in this issue of the MPDV NEWS subjects that are also relevant outside of Industry 4.0: Platform and ecosystem, MES and APS, mApps and AI. Put your trust in the long-standing expertise of the MPDV Group — because we've been keeping our finger on the pulse for more than 40 years.

Have fun reading!

Yours sincerely,



Jürgen Kletti

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The future project from different angles

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Our Highlights

THIS WAS 2021

02/21
Groundbreaking Findings for a PwC Study

MPDV contributes groundbreaking findings to a study on key challenges facing the manufacturing industry by PricewaterhouseCoopers (PwC). Some 44% of manufacturing companies surveyed complained of a lack of transparency with regard to the performance of their production facilities, and 37% of participants said they had too little control over production.

2021 JANUARY FEBRUARY MARCH

01/21
Perfect Production under New Management

Jürgen Rieger becomes a member of the management board of Perfect Production GmbH. The expert for lean management and digitalization has been with the consultancy for manufacturing companies since 2007 and knows the challenges of his customers inside out.

02/21
Smart Factory from the Cloud

MPDV provides all products as Software as a Service (SaaS) and pledges to deliver services in five business days. The applications are accessed online — customers don't need to operate the applications in their own data center.

02/21
First FELTEN Best Practice Day

Digitalizing production — keeping it simple. That's what the FELTEN Group has set out to do. Who could better demonstrate how easily digitalization works in the process industry than satisfied customers? For this reason, customers have their say at the Best Practice Day and report vividly on how production can be digitalized.

FELTEN
Member of the MPDV Group

03/21
Seat in the Senate of Economy International

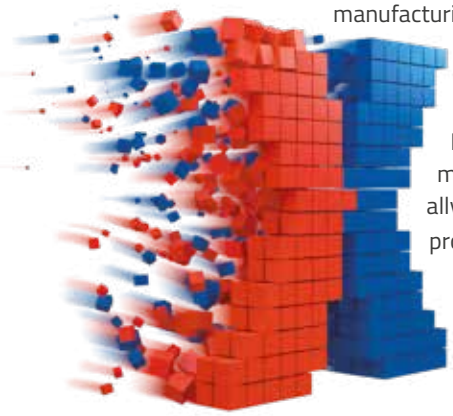
Nathalie Kletti is appointed to the Senate of Economy International as a Senator. Here she campaigns for a global eco-social market economy. With her commitment for the good cause, Kletti follows in the footsteps of her father, Prof. Dr.-Ing. Jürgen Kletti.

04/21
Must-Read for Practitioners

A textbook for Digital Manufacturing Management hits bookstores. This book provides a hands-on explanation of the functions and the use of Manufacturing Execution Systems in production. MPDV founder Prof. Dr.-Ing. Jürgen Kletti and Rainer Deisenroth are the authors and share their comprehensive expert knowledge in this book (only available in German).

APRIL MAY JUNE

04/21
MPDV Revolutionizes the Smart Factory



With HYDRA X, MPDV launches a new generation of manufacturing IT. The system is platform-based and consists of many individual manufacturing apps (mApps). Thanks to the underlying Manufacturing Integration Platform (MIP) and its interoperability, the mApps can interact together and individually in combination with mApps from other providers.

06/21
MES Fit for Industry 4.0

Sheet 7 of the VDI guideline 5600 is published. Using practical case studies, the paper explains where a classic MES needs to improve in order to meet Industry 4.0 requirements. Experts from MPDV were involved in creating the guideline.

09/21
Quick Check for Production

The management consultancy Perfect Production GmbH offers a quick check to manufacturing companies. The check creates transparency in production in a very short time and shows competitive advantages. Individual recommendations for action are available on top — and all free of charge.

09/21
Marketplace for the Integration Platform MIP

MIP

The MIP Integration Platform ecosystem is growing steadily. High time for a totally redesigned Marketplace on the MPDV website! You can access information about partners and applications effortless and in a user-friendly way. Intuitive filter options and full text search included.

JULY AUGUST SEPTEMBER

MPDV SMART FACTORY WEEK

09/21
First Smart Factory Week

Let's get smart! MPDV is hosting the first Smart Factory Week with this slogan. Visitors can expect a week packed with practical examples, expert presentations, discussions and a whole lot of inspiration. The Smart Factory Week shows digitalization in the real world. We say mission accomplished

09/21
FEDRA 2

The Advanced Planning and Scheduling System (APS) FEDRA, which has proven itself since 2020, appears in a new look: FEDRA 2 has many technical improvements. Multi-site planning is particularly noteworthy. It can be used to plan over several systems and locations. Whether a few operations or complex scenarios — everything is possible!

10/21
MIP 2

Everything's made simple: This is how the new features of version 2 of the Manufacturing Integration Platform can be summed up. openID connect offers a simplified way to log on. openAPI simplifies the connection of apps that haven't been developed specifically for the MIP. UI providers give user interfaces (UI) a uniform look and feel.

12/21
Smartphone App myFactoryMania

Something absolutely unique! Never seen before — an interactive smartphone app that introduces young people and students to the Smart Factory in a fun way. The Serious Gaming App myFactoryMania has a legitimate claim: It wants to show that production can be made much more efficient and flexible with the use of a Manufacturing Execution System. Fancy playing? Then hit the App Stores!

OCTOBER NOVEMBER DECEMBER 2022

11/21
Marketplace for Industry

The Marketplace of the Open Industry 4.0 Alliance is launched. This Marketplace centrally bundles all products and services provided by the members. The Marketplace offers different MPDV products — from the Manufacturing Integration Platform (MIP) to the Advanced Planning and Scheduling System (APS) FEDRA.

12/21
The MIP Ecosystem Continues to Grow

The MIP keeps growing and growing. New partners join the digital platform every month, adding forward-looking mApps with a wide range of functions. Users can choose from a variety of applications that they need in their day-to-day manufacturing operations. The MIP Integration Platform ecosystem includes mApps from more than 40 different providers and the number is growing steadily.

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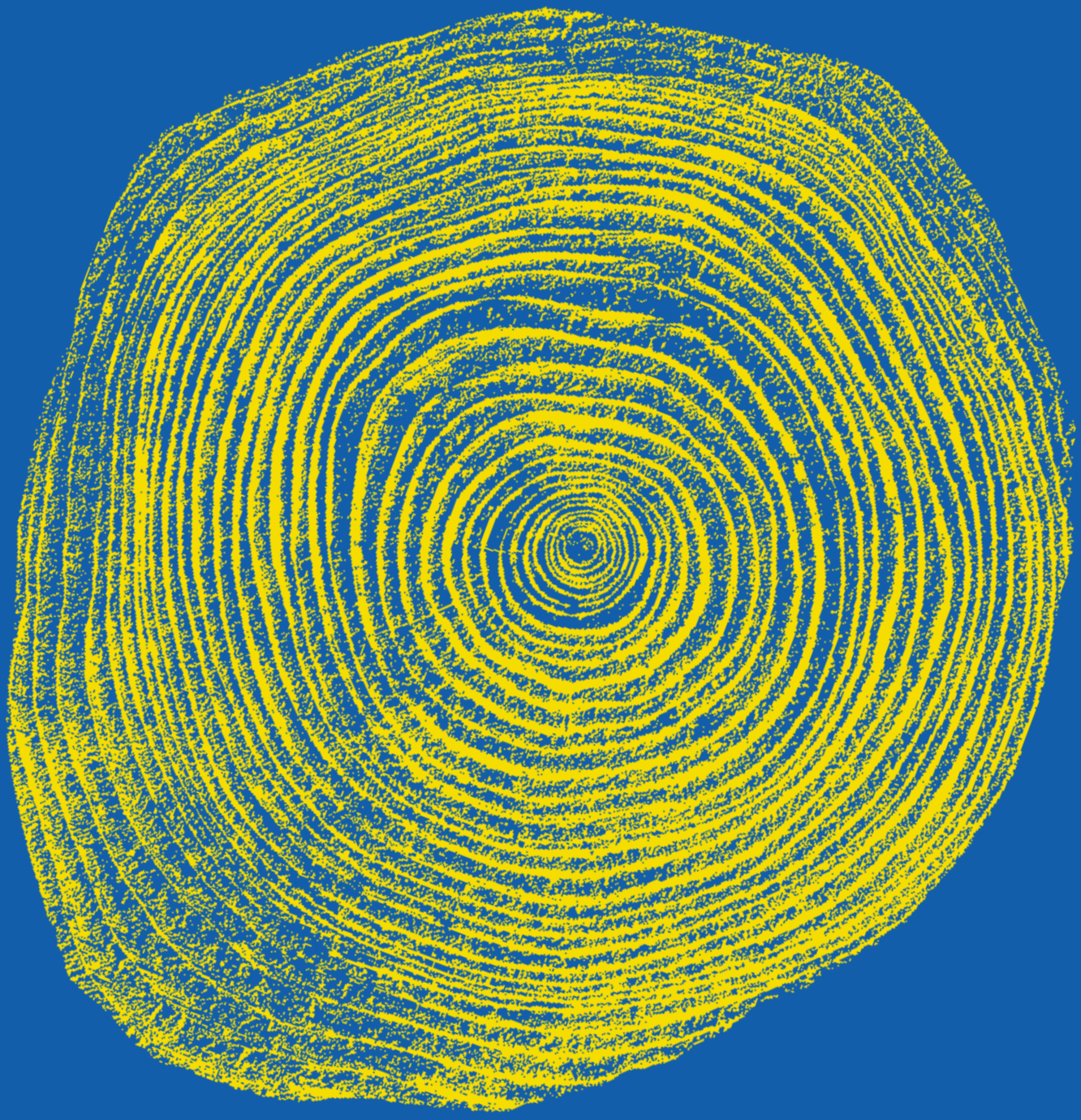
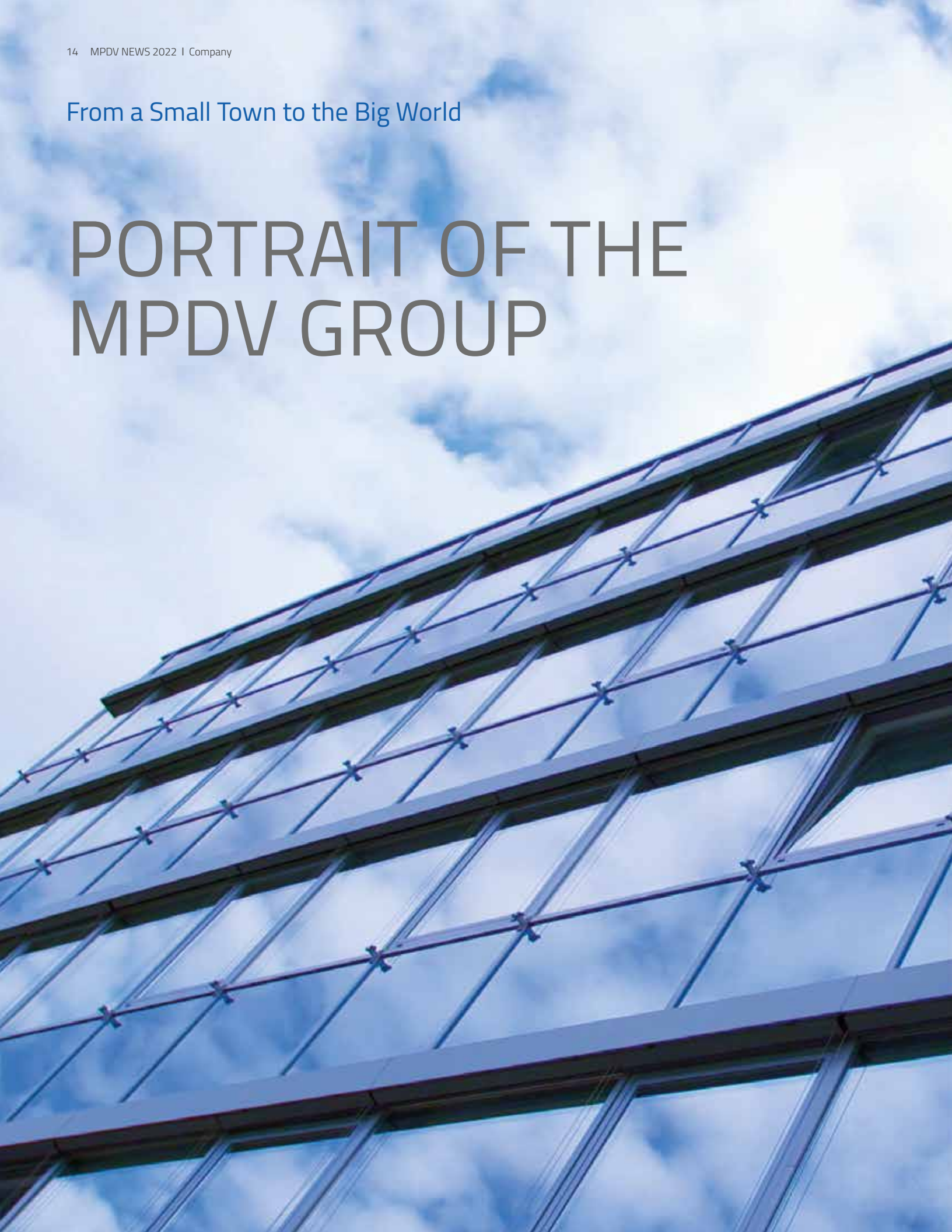


45 + 32 + 18 + 3 = 98

98 is the number of MPDV's years of experience, if you add up the years each company has been in operation: MPDV itself was founded in 1977 and will soon celebrate its 45th anniversary. FELTEN was founded in 1990 and so brings 32 years to the table. Perfect Production consulting company was spun off in 2016, but has been around in the form of the MPDV Campus since 2004 — that's 18 years. In 2019, our AI specialist AIMES was established, which makes a further 3 years in total. The bottom line is that we have almost 100 years of experience in the manufacturing environment — or as we say today: in the Smart Factory.

From a Small Town to the Big World

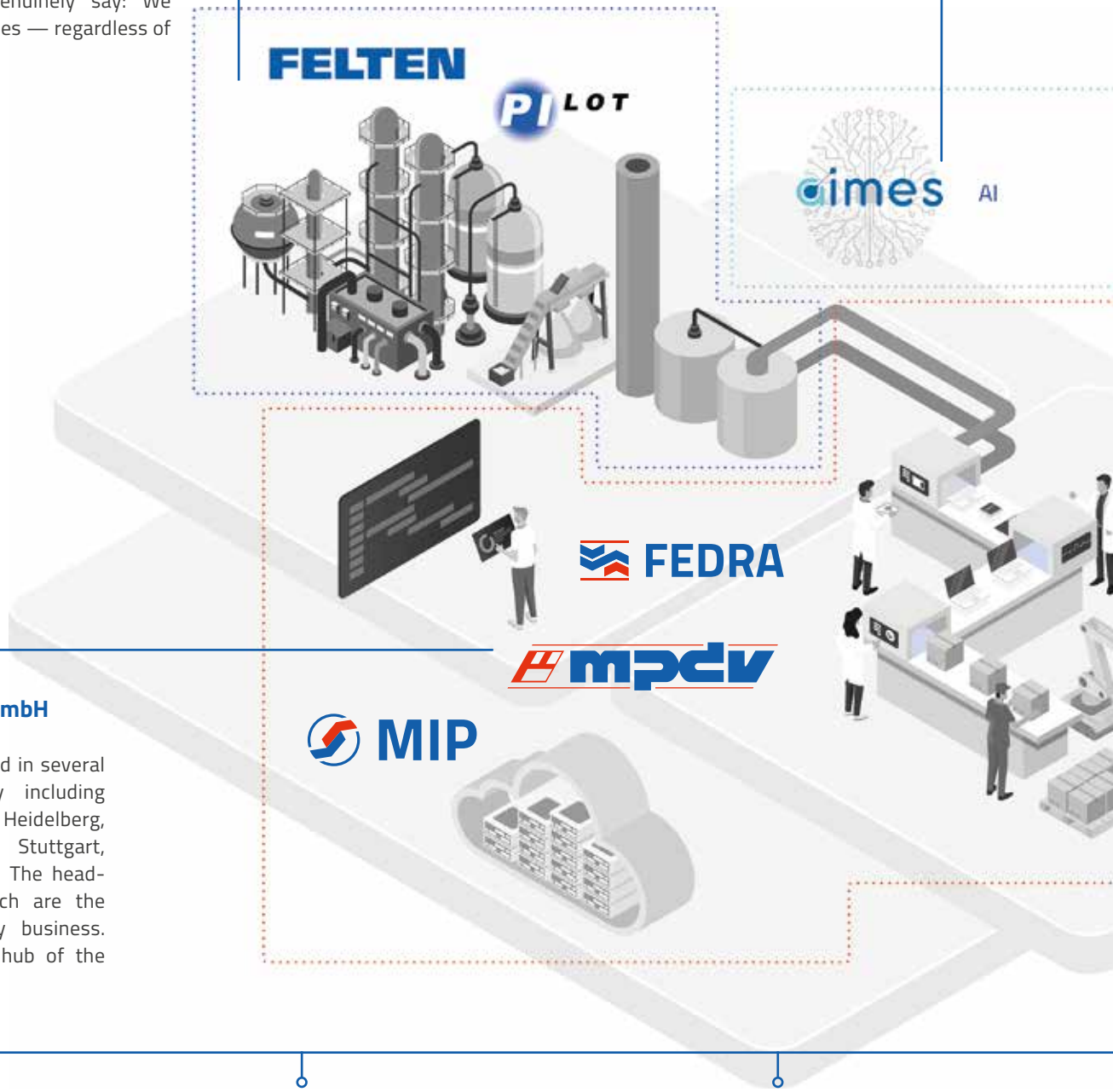
PORTRAIT OF THE MPDV GROUP



In 1977, Prof. Dr.-Ing. Jürgen Kletti founded MPDV Mikrolab GmbH and laid the foundation for today's MPDV Group. The company's name originally stood for **M**icro**p**rozessor **D**aten**v**erarbeitung (German for data processing with microprocessors) and is still inseparably linked with pioneering IT solutions. Starting from the first company headquarters — an apartment in the small town of Mosbach — the worldwide expansion began in earnest. Today, MPDV has subsidiaries worldwide and is at home in all industries. With the slogan "We create Smart Factories", MPDV is taking the vision of the future-proof factory to a new level.

FELTEN GmbH

The FELTEN Group, founded in 1990, has been part of the MPDV Group since 2019. The experts for production IT in the process industry are based in Serrig, Germany. The development site is located in Luxembourg. The MPDV Group can now genuinely say: We create Smart Factories — regardless of the industry!



MPDV Mikrolab GmbH

MPDV is represented in several cities in Germany including Oftersheim near Heidelberg, Heimsheim near Stuttgart, Munich and Hamm. The headquarters in Mosbach are the core of the family business. They are also the hub of the MPDV Group.

MPDV Schweiz AG

To better serve the market of the Swiss Alpine nation, MPDV founded its own subsidiary in 1998, which is now headquartered in Frauenfeld in the canton of Thurgau.

MPDV USA Inc.

Since 2007, MPDV has been operating a subsidiary in Chicago, USA. MPDV USA Inc. primarily serves the North American market all the way down to Mexico with manufacturing IT.

MPDV Asia Pte. Ltd.

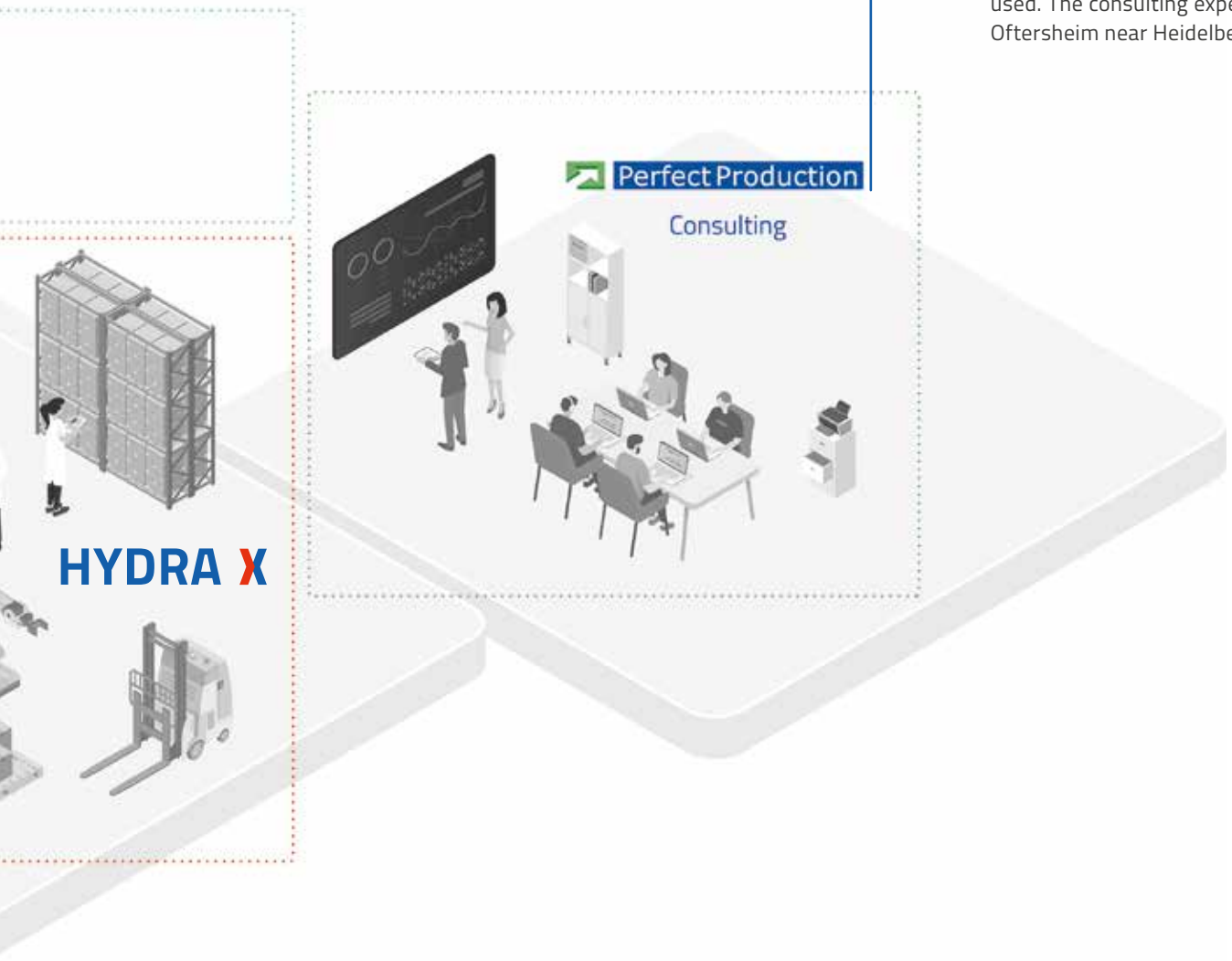
Since 2007, MPDV has been serving the Asian market out of Singapore. MPDV is now employing in-house developers at the Singapore location to better meet regional needs.

AIMES GmbH

In 2019, MPDV also established a joint venture with the AI specialists PerfectPattern to align artificial intelligence methods and applications with the needs of the Smart Factory. AIMES stands for **A**rtificial **I**ntelligence for **M**anufacturing **E**xcellence **S**olutions. The decision paves the way for even more innovation in the Smart Factory. The company's headquarters are in Mosbach, Germany.

Perfect Production GmbH

In 2016, MPDV spun off the former Campus Consulting into Perfect Production, setting up a vendor-independent management consultancy for lean production and lean IT. One of the reasons for this decision was the experience that many industrial companies do not even know which potentials lie dormant in their production and how they can be used. The consulting experts are based in Oftersheim near Heidelberg.



MPDV Software and Technology Services (Shanghai) Co., Ltd.

Since 2012, MPDV has been focusing on the Chinese market with its own subsidiary in Shanghai. We now have our own developers working here as well.

MPDV Malaysia Sdn. Bhd.

The latest member of the MPDV family is the subsidiary in Kuala Lumpur, Malaysia, which was founded in 2019. MPDV's location helps meet the need for software solutions to increase efficiency in manufacturing in the Asian region.

A Chat with the MPDV Executive Board

ONE-TO-ONE INSTEAD OF B2B

MPDV ISN'T MEANT TO CHASE AFTER SOMETHING: WE SET TRENDS!

What was a great adventure playground for Nathalie Kletti as a child has now become her second home. It's a similar story with Jürgen Petzel and Thorsten Strebel, at least when it comes to the home. After umpteen years at MPDV, they are equally familiar with every nook and cranny of the company. Each of them knows the internal structures, the customers and the market.

However, knowing hard facts is not enough to successfully run a business as a threesome. Strategic issues, commercial decisions and new products are not the only aspects to consider. Equally important are a shared dialog, trust and mutual understanding which are normally associated with the comfort of your home. We had the opportunity to take a seat on the virtual sofa and cast an eye over otherwise invisible facets to understand how the MPDV management ticks.

Three executives, three areas of responsibility, three personalities: What are their greatest assets?

Nathalie Kletti: I've only really been instrumental in shaping the last decade at MPDV, but I was involved in a lot of things before then as well. I have known many of the employees since my childhood days and I appreciate the open exchange with them. Being so closely tied up with the company, I have a good nose for things and know which direction they are heading, which helps the company to go forward.

Thorsten Strebel: Looking at a system or a process, I immediately have a structure in mind, some sort of flowchart. I combine things until an overall picture emerges and all the pieces of the puzzle fall into place. Transposing, in other words, comparing what I see with my wealth of experience, is very important in this process.

Jürgen Petzel: In sales, I deal with an array of people from all industries and cultural backgrounds. There is a difference between talking to a controller or a machine operator, and visiting a customer in my native Westphalia or in an unfamiliar region. That's why I see myself as someone bridging the gap between people and cultures. I need to know what drives my counterpart, I have to take them along and generate some enthusiasm.

You would think that things would be strictly rational in the manufacturing environment, right?

Thorsten Strebel: Figures, measured values and verifiable facts can be found everywhere, but you also have personal feelings and uncertainties. After all, it's always about people. B2B stands for the notion that companies do business with other companies. But it's always people who do business with other people and each person has their own personality. A person does not change just because he or she joins a company. Maybe their professional role is somewhat different from their private persona, but they are looking for people with a similar outlook — who they like and trust.

Jürgen Petzel: We work with and for people, and if we ignore that and act as if we were dealing with mere entities, we wouldn't be successful.

Nathalie Kletti: I don't really believe in an either/or. Both exist — gut feeling and rational thinking. And that is a good thing. Emotions shouldn't play a great part in a professional context. You would like to believe that people in their professional life always make strictly rational decisions. But that is not the case. After all, emotional decisions are not automatically irrational. Putting emotions on the same level as being irrational is actually a misconception. In fact, emotions can be used to make decisions very quickly.

Thorsten Strebel: There are neuroscientists who claim that the brain is only there to justify what the gut has long since decided.

IT DOESN'T WORK WITH BRUTE FORCE. IT TOOK MORE THAN TEN YEARS FOR ONE COMPANY TO BECOME OUR CUSTOMER.

THE IMPORTANCE OF PROCESSES FOR CORPORATE SUCCESS IS SOMEHOW UNDERESTIMATED.

IT'S NOT COMPANIES INTERACTING BUT PEOPLE.

TO BE ON THE MOVE WITH AN EYE TO THE GOAL, YOU ALWAYS HAVE TO BE ONE STEP AHEAD — OR SOMETIMES YOU NEED TO STEP TO THE SIDE.

When it comes to decision-making, people are always swayed by other people and their experiences...

Thorsten Strebel: That's true and probably goes for all of us. When a friend recommends a product to me, my inclination to buy is much higher. That's why I think references from our customers are so important. Companies need to get the appetite for change. If we have a vision together and don't have to wrestle with mistrust and resistance, we can truly enjoy it.

Jürgen Petzel: Companies see that we know their problems when we speak the industry's language and can convey that we really know what we are talking about. This creates trust.

Nathalie Kletti: I once had a conversation with Reinhold Würth about the question of why customers buy products from a particular company. After all, Würth is not the only one selling screws. Screws are products that are clearly specified. So you might think that if screws are all the same, then the price alone decides. But that is not the case. It is also about soft factors — sympathy, brands and marketing. The first impression counts and this also applies to companies, including MPDV. So we have to deliver the message very quickly. In essence, MPDV is like a human personality.

Jürgen Petzel: The formula is quite simple: people buy things they need from people they like.

Trust is the quintessence
It is much easier to trust people than objects.
What about autonomous driving? Who dares?

Nathalie Kletti: Maybe not yet. I actually lack basic trust in this technology. I don't even use cruise control in my car. But who knows what will be in a few years? Then people might be more inclined to change their mind and say: Why should I drive myself? Time often determines the success or failure of innovation. Or all of a sudden things enter the public mind and are thus accepted more quickly.

Jürgen Petzel: I tried it before — hands off the steering wheel whilst driving along a country road. At the beginning it's very unfamiliar, but after a few kilometers the confidence grows and you get a clear idea of the hidden potential. Which is why I say: Just give it a try! That's the advice I always give to our customers.

Thorsten Strebel: I find autonomous driving exciting. If you're on a long-distance trip, it's pretty easy to find yourself not paying 100% attention. Your thoughts are somewhere else entirely — lasting only a blink of an eye. That's when electronic helpers make a lot of sense, like the ones that already exist: lane recognition, distance control, brake assist. When you combine all these assistance systems, it's a bit like autonomous driving.

Nathalie Kletti: I find it remarkable how heatedly such trends are debated in public at the outset. When it comes to automation and AI, robots often take over the world at the height of the discussion. Eventually, the usual thing happens: The excitement subsides. At some point, you can take a leisurely look at what has caught on or not.

Jürgen Petzel: That hasn't changed in the past 25 years either. I can remember appointments in the mid-1990s. Back then, whenever we went to a company and presented IT solutions, a cold front would suddenly hit us in the meeting, that's how frosty things got. People were afraid that the IT revolution would rationalize their jobs away.

IT IS IMPORTANT THERE'S A NUT FOR EVERY BOLT. COMPANIES, PEOPLE AND PHILOSOPHIES MUST GO TOGETHER.

But the much-feared revolution is more of an evolution, right?

Thorsten Strebel: The public discussion is often dominated by exaggerations. That's how you generate circulation or clicks. That's how people behave. It's simple attention economy. But the world changes constantly.

Nathalie Kletti: But usually not in a flash. Revolutions are quite rare. People don't wake up in the morning and everything is different. In retrospect, things often look that way ten years down the road, but when you witness developments from the very beginning, it usually doesn't feel so revolutionary anymore.

Jürgen Petzel: When I compare what we did in my early days at MPDV and what we are doing now, it is indeed a revolution. But when you're in the middle of it all, it simply boils down to taking one step after the other — you just work on the next project or task. Hey, what about a specific product for a certain branch or customer? How about modifying it and using it in a completely different industry? And so the story goes — until you arrive at HYDRA X. Whereas HYDRA X is a very big step.

Thorsten Strebel: HYDRA X definitely feels like an evolution to me.

Nathalie Kletti: Whereby the basic idea is quite revolutionary. Initially, there were discussions internally: Aren't we creating unnecessary competition for ourselves if we accept applications from other providers? Aren't we going to banish ourselves?

Jürgen Petzel: The answer to this is quite simple. Customers only use apps from other providers if they are better than our very own ones. So we have to try harder and offer better solutions for the market to opt for us. Trying to enforce your own apps and exclude apps from other providers via a closed system will not work in the long run. I am convinced that the future lies in collaboration.

Thorsten Strebel: For me, the platform concept of HYDRA X is one hundred percent MPDV: Change your perspective, question yourself critically, develop yourself further, no matter how uncomfortable and exhausting it may be at times. That's why I've been enjoying coming to MPDV every day for more than 20 years.

Thank you for the interview.

Joined the MPDV executive board in 2020, where she is responsible for the strategic development of the MPDV Group, marketing and university cooperations.

Can't remember a world where MPDV didn't exist. Lives and loves the company and follows in her father's footsteps with know-how and intuition. Believes that the human and the emotional factor will soon find their way back into the world of digitalization.

Has been a member of the MPDV executive board for more than a year. Among other things, he is responsible for product management, product development and the strategic expansion of MPDV's range of services.

Describes himself as a "change junkie" and thinks you should challenge yourself on a daily basis and he is well aware that not everyone likes change as much as he does. Artistic and creative subjects are not his strong points, and he prefers to leave map reading to those who are better at it than he is.

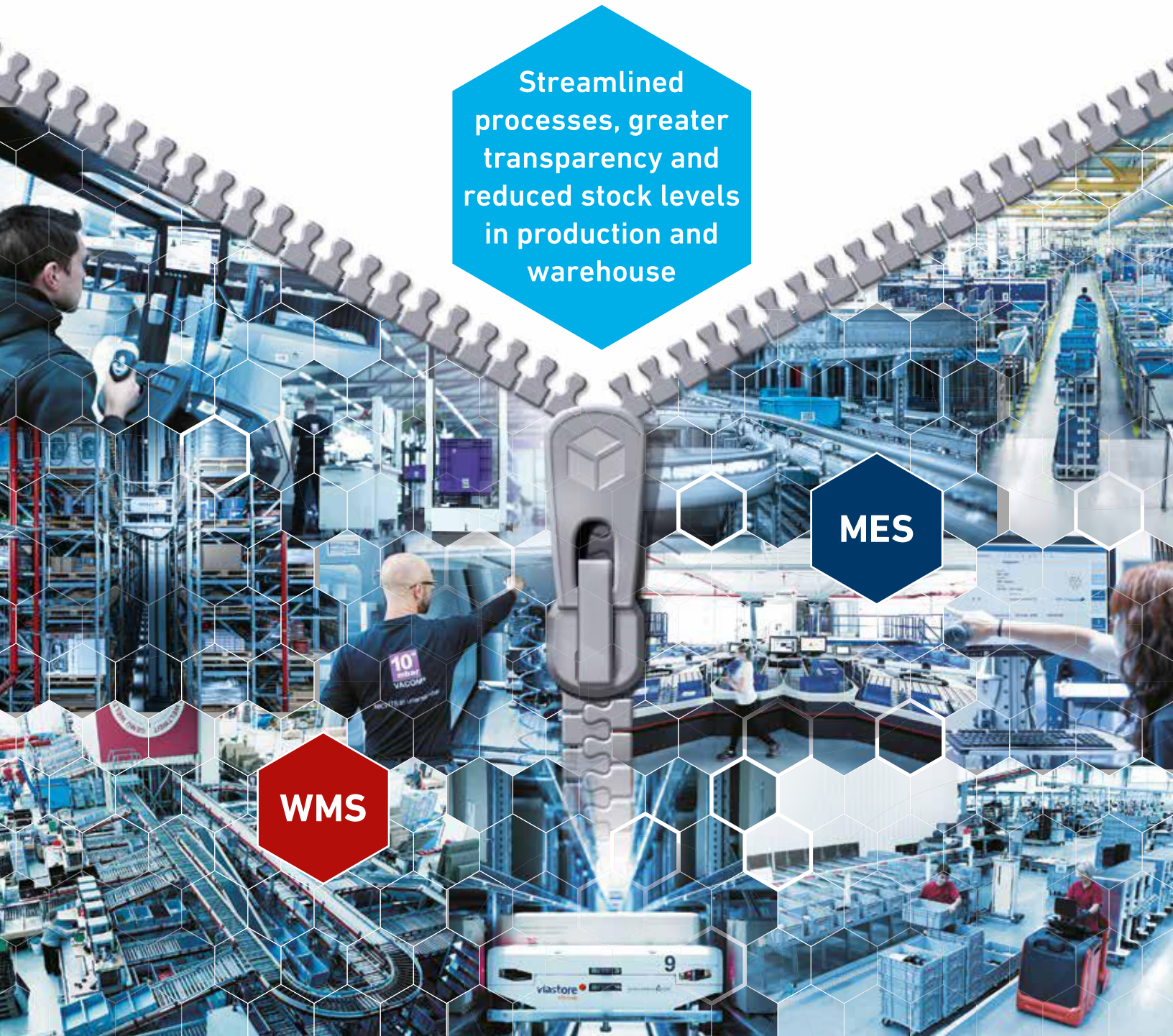
He single-handedly founded the MPDV location in Hamm at the end of the 1990s and expanded it over the years to become the most important sales office. As of 2020, he has assumed responsibility for the entire Sales division, both nationally and internationally, as chief sales officer.

Life without MPDV is possible for him, but pointless. He has seen MPDV grow from 25 to 500 employees and knows from his own summer job experience how manufacturing works. Describes himself as a "pragmatic man of conviction with staying power". Understands that being right and being proven right are two different things.

viastore SOFTWARE

INTEGRATED PROCESSES IN LOGISTICS AND PRODUCTION

viadat warehouse management system (WMS) with standard interface to the HYDRA MES



From the Basics to the Processes

30 YEARS OF KNOW-HOW IN THE PROCESS INDUSTRY

For more than 30 years, the FELTEN Group has been one of the pioneers and experts when it comes to digitalization of the process industry. The process chain is subject to different requirements compared to discrete manufacturing — these are manifested in the FELTEN products and their functionalities.

"Our PILOT:MES is a perfect fit for the process industry — from the terms used in the software to the process mapping", says Martin Seer, software consultant at the FELTEN Group, describing the application. Customers instantly find their way around their own processes and can easily map their process steps in the standard software. Be assured that digitalization shouldn't be overly complicated. "Many companies are reluctant to take the first step because they believe digitalization to be much more complex than it actually is. Connecting analog machinery to an MES software may initially seem like an insurmountable hurdle, but for FELTEN it's a piece of cake.

Continuous production, quick order change

The next steps are just as easy: The MES is compatible with many other systems and is designed to be open to interfaces. "Data can be accessed elsewhere or forwarded. This means that we can provide the right info to the right people. It goes without saying that the software is web-

based and compatible with the latest web technologies. Perhaps less self-evident is the fact that FELTEN can map not only order-related batch production, but also continuous production. "Then production is not tied to a specific order from the ERP, but runs non-stop 24/7, for example."

A quick order change is also possible: "In that case, either the batch, or the entire product changes at a specified event." Thanks to PILOT:MES, complete traceability is also guaranteed. Although tracking & tracing is an integral part of discrete manufacturing, it has a completely different status in the process industry. "In simple terms, everything that people consume must be traceable by law," Martin Seer explains.

ABOUT THE PERSON

Martin Seer has been working as a software consultant for the FELTEN Group since 2017. The business information scientist advises companies on how to introduce Manufacturing Execution Systems and gives workshops on digitalization in manufacturing.

Whether it's the GMP guidelines in the pharmaceutical sector or batch tracing in accordance with EU Regulation 178/2002 and IFS in the food industry, the specifications documented in these sets of rules must be strictly adhered to. "If a consumer complains about a bar of chocolate, the manufacturer must be able to check exactly which ingredients and batch numbers went into that very bar." This is similar in the pharmaceutical sector or in cosmetics production.

Reduce efforts, minimize errors

In recent years, an increasing number of customers have added optional certifications to the statutory requirements. Shorter product life cycles and smaller batch sizes are also contributing to an increase in administrative efforts. The variety of orders means an increase in paperwork and more complex setup and order planning in production. Digitalization is inevitable at some point. "A company needs to know at any given time what is going on in the shop floor. This is not possible when paper is still being used in production."

The FELTEN solutions do not only help to reduce the administrative effort, they also reduce the error rate by supporting people in their production tasks. "We guide the operator through their work steps and make sure they execute them correctly," explains Martin Seer, adding, "the aim is to support the operator and also to document all the information reliably so it can be traced subsequently."

Looking at the rising energy prices, the issue of energy management could become even more pressing. "The consumption of electricity or water is often still taken for granted, but it would be easy to show and evaluate the consumption and identify ways to optimize it," says Martin Seer. For example, production processes could then be planned in such a way as to significantly reduce cleaning efforts and the associated water consumption and costs. Load peaks could also be avoided — provided the necessary transparency in production is in place. Only then can potential be explored, found and exploited.

Interview: Jürgen Rieger

WHAT MAKES A PERFECT PRODUCTION?

Jürgen Rieger has been a member of the management team at Perfect Production GmbH since the beginning of 2021. (Source: Perfect Production GmbH)

"Some companies suddenly feel that they urgently need to jump on the Industry 4.0 bandwagon because their competitors are already digital. In this case, companies take the second step before the first one."

Jürgen Rieger started as a senior consultant at Perfect Production GmbH in 2007 and has been a member of the management team since the beginning of 2021. His training as a toolmaker was followed by a degree in production engineering. He has been involved in both conducting projects and developing strategies. Jürgen Rieger knows exactly what he is talking about when he advises manufacturing companies on lean management, digitalization and other issues. In this interview, he explains what it takes to achieve a perfect production.

Mr. Rieger, what is the secret, what actually makes a perfect production?

Jürgen Rieger: Several things are important in this context. In perfect production, all processes are understood, transparent and integrated in routines. There are no losses, lead times are short and everything runs smoothly and efficiently. To get there, a whole lot of change is required in many companies, but change is what drives perfect production. That's why it is crucial for employees to be informed right from the start. They must support the different steps, otherwise sooner or later the project will collapse like a house of cards.

What is the biggest challenge companies are facing?

Jürgen Rieger: Most companies find it hard to motivate their employees to welcome change. A lot of employees have been working in production for a very long time and have always been doing things this way. Perhaps staff has been confronted with changes time and again over the years that were costly, but led nowhere. In both cases, employees lack the willingness to do things differently. Companies that failed to introduce lean management several times in the past will have even more difficulties to overcome this hurdle and tackle the issue once again. Other companies suddenly feel that they urgently need to jump on the Industry 4.0 bandwagon because their competitors are already digital. These companies might want to take the second step before the first one.

May I intervene here and ask you what exactly are the steps on the way to the perfect production?

Jürgen Rieger: We focus on the five building blocks of perfect production. This seems to be a lot of theory, but in fact the approach is quite hands-on. We like to have a look at production on site and get a first impression together with our customers. We can see at this point how things are running and identify problems. We then meet operators at their machines, supervisors and quality engineers and collect all information we require. Having defined the status quo with a value stream mapping, we face lean issues, digitalization and lean administration. Last but not least, we look at the KPIs and build control loops. This ensures that improved processes work in the long run.

Do companies always proceed this way?

Jürgen Rieger: It depends. Some customers approach the issue as a whole. Others know exactly what they want or at least what they don't want. If a customer has been working with lean techniques and they have become part of the process, then they might be interested in the next step, which is digitalization. This is what we focus on. However, we keep our eyes open and if we find potentials for optimization in other areas, we inform the customer. The new findings can then be integrated into the current project.

"However, our customers soon realize that we are very well versed in production technology and processes and that we know our way around."

Are there many differences between projects?

Jürgen Rieger: The way to perfect production is never the same. Together with the customer, we first see to what is actually needed. Take the example of mass production or one-off production. Each must be approached differently. A corporation with large-scale production that manufactures products in quantities of millions has other priorities than a company that manufactures customized products. As a result, there are varying demands when it comes to shaping a production principle. One company might operate a high-technology plant with mostly automated production lines manufacturing products with few variants in high quantities using the flow principle. In another company, it is all about work systems where a great deal is done manually. Here, we need to integrate flexibility.

You said that it's important to take people on board when you want to change things. How do you deal with employees' reservations?

Jürgen Rieger: We always try to communicate on an equal footing. I myself trained as a toolmaker and it is not unusual for me to talk shop in production when meeting operators or production managers. Employees realize very quickly that we don't just talk superficially and refuse to get our hands dirty, but that there is real knowledge behind it. Within a very short time, we familiarize ourselves with the technology and processes in production, understand relationships and ask the right questions. This creates trust. Of course, we not only visit the shop floor in jeans and safety shoes, we also meet the management. It all depends on what is needed at the time.

What is special about Perfect Production GmbH?

Jürgen Rieger: It is true that when thinking about big management consultancies, you have a specific character in mind. That's kind of a cliché. These consultants are more strategic in their approach and don't go all the way to shop floor level. Others know about lean management, but nothing about digitalization. Or they lack access to management. These are all things that we cover and know our way around. Regardless of the size or industry of a company or the objective to reach: We can do it! And thanks to our proximity to MPDV, we bring a wealth of digitalization knowledge to the table. Nevertheless, we are vendor-neutral and our customers appreciate that. We have been preparing MES specifications for our customers for many years now. These specifications are used to enter the tendering process and select a suitable supplier. The MES that best meets the customer's requirements wins the race.

Again, very briefly: What matters most?

Jürgen Rieger: Two things: the right partner and the comprehensive approach. We help companies manage all steps on the way to perfect production and save them from the mistake of digitalizing the existing complexity. We first look at the processes, simplify wherever possible and optimize them by means of digitalization. After all, it is essential for us to put everything on a stable footing and to align it in such a way that it is permanently embedded in the company.

Thank you for the interview.

About Perfect Production

Perfect Production GmbH is a management consultancy for manufacturing companies that is headquartered in Oftersheim. The consultants and trainers are experts in lean management, digitalization, sustainable process improvement and continuous improvement coaching (CIC). Perfect Production GmbH is part of the MPDV Group.

Who we are and what we stand for

HUMAN OR MACHINE?

Owner-run family business or global player? Regional responsibility or international growth? Culture or economy? Values or returns? Human or machine? Opposites that aren't opposites for us. On the contrary: only when the opposites are in perfect harmony can we achieve holistic success. Our work is not about man or machine. Human with machine — that is our game!

We are not only aware of our responsibility in society, but also of our obligation to the younger generation. Our educational ambition includes introducing young people and students to the future subject of Smart Factory at a very early stage and providing systematic support for the next generation. We have been cooperating with universities for many years and are committed to providing vocational training. Proof is our Junior Academy, which promotes young talents at an early stage. We know how important it is to get young people interested in STEM subjects (sciences, technology, engineering, mathematics) and to introduce them to information technology in a fun way. In different seminars on robotics, microcontrollers and automation, kids from the 6th grade upwards have the opportunity to try their hand.

"I think it's great how MPDV is committed to educating students and young people in the field of Industry 4.0 and the fantastic projects we have implemented in a very short time."

Laura Kirstätter,
Research & Education Manager

People are the most important factor — what sounds like a cliché is reality for us. We think and act economically to guarantee our employees secure jobs in a family-friendly working environment. A healthy work-life balance is just as important to us as a friendly and cultivated working atmosphere. We are aware that our employees lead a life outside of work, pursue hobbies, participate in social clubs, work as volunteers or are involved in civil protection. We make sure that our employees are released from work if duty calls.

"For some years now, we have been growing considerably, but we never lose sight of our roots as a family business. This is good and important to me."

Apostolos Mitsios,
Director Customer Service

"I simply enjoy supporting our customers on their way to the Smart Factory with well thought-out solutions and working together to advance their digitalization."

Uwe Friederich,
Executive Manager Sales

However, our products and services also have a clear focus on people. Their objective is to make everyday work easier, to make production more efficient, and thus to support the careful use of resources — all in the name of sustainable environmental awareness. The entire management of MPDV stands for the social responsibility of the company.

Become part of the team!

mpdv.info/career

THIS IS WHAT MPDV STANDS FOR

M — Motivated
Our motivated employees focus on the requirements of our customers. We support our employees wholeheartedly because the only way to success is working together. We promote and motivate our employees with numerous internal initiatives and, as a self-financed family company, the promotion of young talent is a central concern. Social participation is of great importance to us and so we have been sponsoring sports events and cultural activities.

P — Professional
Communication between our employees and customers takes place on an equal footing, which reflects our employees' competence and experience. Thanks to our pioneering project management, we regularly set ourselves new benchmarks and goals. Industry-wide standards and industry-specific solutions are no obstacles to us, and we use constructive criticism to continuously improve.

D — Dynamic
Businesses only last for around 10 years on average before they disappear from the market again. In an industry as dynamic as ours, the average age is likely to be even lower. Why have we been around four times as long now? We believe the answer is that we are constantly changing. We are innovative and open-minded, and as dynamic as the industry in which we work. And perhaps sometimes there was just a bit of luck involved.

V — Visionary
The road to the Smart Factory is usually a longer one, and for the companies that take it, an extremely important one. This is why companies need a partner with a vision. We need this vision to develop individual and sustainable solutions together with the customer to provide planning security and transparency for the future. This vision enables us to take the burden off our customers' shoulders and deliver the perfect package: a solid investment and a system tailored to their needs.

Sponsoring DHBW Mosbach

WITH MPDV TO THE DESERT

Mosbach and the Mojave Desert: They share about as much as a snail and a tunnel boring machine. Well, certainly at first sight. We reveal how it all ties up, why MPDV plays a role in it, and what Elon Musk has to do with it.

It all started in the fall of 2020 with a call for bids from "The Boring Company," a company owned by Tesla founder Elon Musk. His vision: to move traffic underground in tunnel tubes. His goal: to transport people and goods quickly without traffic jams. His problem: the construction of such tunnels takes ages. His solution: a contest of ideas to speed up the tunnel construction and reduce costs.

More than 400 teams from all over the world answered the call entitled "Can you beat the snail?" Among them are six students from the Baden-Württemberg Cooperative State University (DHBW) Mosbach. They set out to develop a tunnel boring machine that digs through the earth faster than a snail crawls through a garden. But how fast is a snail? According to the Guinness Book of World Records 1998, Archie a garden snail covered a 13 inch course in 2 minutes at the 1995 World Snail Racing Championships, held in Longhan, England. That's an impressive 9.36 m per hour.

The concept and design for the Dirt-Torpedo, as the students call their drill, went down well with the jury. In fact, the students were so good that they made it into the top teams in the competition. Alongside the renowned Massachusetts Institute of Technology, ETH Zurich, TU Munich and other participants, they are part of the "Digging Dozen" and among the finalists.

SHOWDOWN IN CALIFORNIA

Since the "Not a boring competition" focuses not just on the concept and design, but also on the implementation, the participants tinker and toil, build and screw. In the end, the students have to take their drill to California's Mojave Desert between Los Angeles and Las Vegas for a field test. That's when the Dirt-Torpedo has to show what it can do.

The brief is to drill a 30-meter tunnel with a diameter of half a meter and a mini Tesla will drive through the tunnel by remote control. Three categories are evaluated: The time required to drill the tunnel, the time it takes to complete the wall, and the accuracy of the work. The Dirt-Torpedo is much more than a humdrum tunnel boring machine: it drills in the front and pours concrete in the back. In between it blows the crushed rock with a vacuum cleaner in front of the borehole.

MPDV is also present at the showdown in the Mojave Desert — at least with our company logo. As a long-standing supporter of the DHBW Mosbach and with a clear focus on promoting young talent, we have joined the project as a sponsor. We are financing the construction and transport of the Dirt-Torpedo and support in this way the students in their mission.

Smart Factory To Go: myFactoryMania

FROM THE BOARD GAME TO THE SMARTPHONE APP

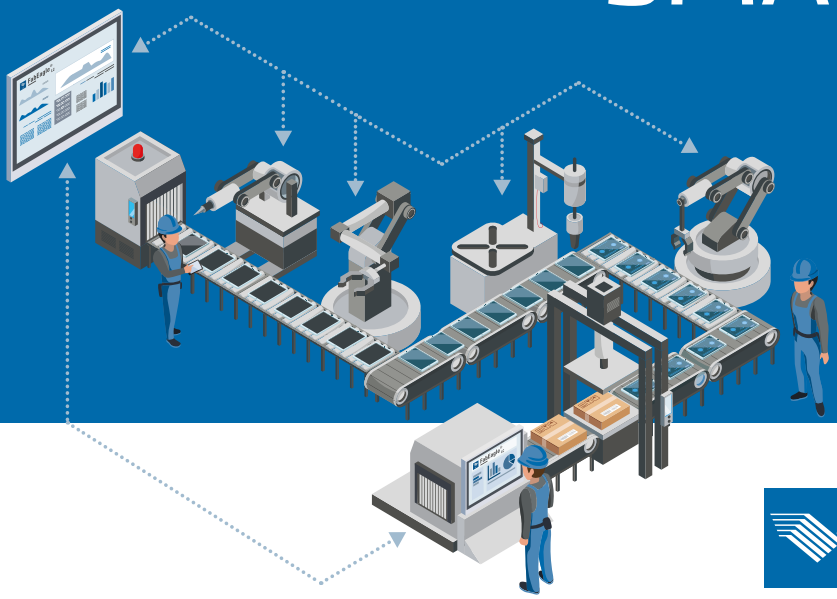
Playful knowledge transfer often delivers more than any theory — regardless of the age. With this in mind, you can extend your Smart Factory know-how with our new Serious Gaming App myFactoryMania. Players could already experience the benefits of using a Manufacturing Execution System (MES) in production with the HYDRA board game. The gaming app now brings the game into the digital world with a completely revised concept.

Be it at the breakfast table, during lunch break or on the couch in the evening: your smartphone is always at hand. So why not combine the pleasant with the useful and learn something while playing games? The app conveys quite vividly that an MES helps to produce much more efficiently and respond with greater flexibility.

AND THIS IS HOW myFactoryMania WORKS:

- The game starts with an empty factory floor, which fills up with machines and busy machine operators as the game progresses.
- The goal is to efficiently complete as many production orders as possible to reap in maximum profit. The orders differ in execution time, complexity, and revenues earned after the order is successfully completed.
- Initially, players need a machine park to start production. In a next step, they can digitalize the factory and invest in MES modules.
- As the game progresses, you can clearly see how — thanks to smart investments in the right machines and MES modules — efficiency increases. Assets grow quickly with a little gaming skill and can be reinvested. Digital gaming fun for every Smart Factory fan.

CONNECTIVITY FOR SMART FACTORY

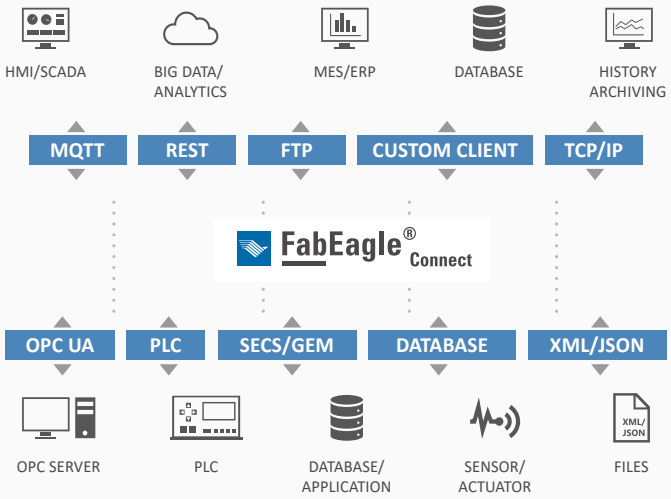


Configure interfaces instead of programming

FabEagle®Connect is your tool for the integration layer and connectivity in a smart factory. As a partner of the MPDV Marketplace, we connect your machines with the MES HYDRA or your ERP.

YOUR ADVANTAGES

- Simple connection of existing machines to IT systems without special knowledge and with low maintenance effort
- Transparency across the entire site through gradual integration



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THE BENCHMARK IN INDUSTRIAL SOFTWARE

Always Looking for the Wow Factor

BITE-SIZE KNOWLEDGE

We know the pain points of our users and the industry trends — and process all the information into little knowledge nuggets for in between: How-to videos on YouTube, articles on the Smart Factory blog, posts on social media channels. Always looking for the wow factor.

NOT A CLUE? NO PROBLEM!

No idea how an IIoT connector functions? No idea how to go about to implement a shop floor management? No idea how mobile time tracking works? Then check out our digital channels regularly and generate your own personal wow effect.

Scan a QR code and discover all the digital channels:

Visiting Holger Hartweg

IT'S ALL IN THE MIX

Holger Hartweg joined MPDV ten years ago as an account manager at the German sales office in Hamm. Since 2020, he has been responsible for sales in Germany and other European countries as Director Sales and leads the sales teams in this region.

Holger Hartweg's story is one of great commitment and mutual support across teams and beyond hierarchical levels. It is also about personal development and corporate growth. "Back when I started as an account manager in Hamm, the company presentation showed 200 employees on the slides, now we are 500." At that time, almost ten years ago, Holger Hartweg moved from a listed technology start-up to a down-to-earth, owner-managed medium-sized company: MPDV. Holger was interested in the company's direction and impressed by its clear focus. MPDV saw at an early stage that it wanted to play a central role in digitalization and worked continuously towards this goal. "To achieve goals, MPDV's mantra has always been that everyone gets the support they need to do their job." This means for Holger that he can devote himself wholeheartedly to sales.

As an account manager, the qualified electrical engineer initially built up his own customer base before assuming the role of local sales manager in Hamm in 2016: "I took over a very well-functioning team, further expanded it and more than doubled its size." In the course of MPDV's growth, he was offered the position of head of sales for Germany and other regions such as Benelux and Poland in 2020, and Holger accepted the challenge. What does it really mean to be responsible for sales?

> "Being in a partnership with customers and meeting a variety of requirements is the name of the game in sales."
>
> Holger Hartweg, Director Sales

Above all, it means one thing: "You have to be in constant communication with customers and colleagues, questioning what has happened so far and developing new creative ideas together to find a solution for the customer that allows them to fully exploit their potential. Being in a partnership and meeting a variety of requirements, that's the name of the game in sales." It is important to engage in dialog — both externally and internally, he says. "That's why I encourage and call for open communication with colleagues. We draw together our experiences and decide how best to approach projects."

Insights gained from such discussions also benefit the MPDV Sales Academy, which Holger founded two years ago along with other colleagues. Internal seminars train new employees and form vital elements of a well-founded and qualified induction program. Every new experience translates into new material for the Sales Academy, which is continuously improved and stepped up as a result. Employees benefit from targeted training with real-life examples. The Sales Academy also deals with customer meetings and tough questions in the form of role plays — sometimes with Holger being the demanding customer.

Admittedly, every day, every customer, every negotiation is different, but one thing is always the same — a full calendar. Especially so in times when customer visits rarely happen and remote sessions replace face-to-face interactions. Like every true salesman, Holger prefers genuine customer meetings. After all, it's this combina-

tion that makes his job so appealing: "On the one hand, I walk through production wearing safety shoes and talk to operators and shift supervisors about their daily challenges. On the other hand, I conduct negotiations or contract talks with the executive management." Be it customer visits or trips to the MPDV sites — Holger is on the road all the time, because it is important to him to be up and close. That's why he can be seen — whenever possible — at the different company locations or at the company's headquarters.

Privately, Holger Hartweg also likes to be "on the road", but in this case rather peacefully in a camper van. "No matter if my wife and I are weathering autumn storms on the coasts of the Baltic or North Sea or hiking in the mountains. We love to be on the road with our van." Together with his wife, his two grown-up children and a small menagerie consisting of a dog, a cat and a horse, he lives in the tranquil Münsterland region of Germany. What the Münsterland is to him privately, is MPDV to him professionally: a focal point. "Despite its rapid growth, MPDV is down-to-earth; our company is characterized by great teamwork that goes for all divisions. We all stand behind decisions and support them." These factors make it easier for Holger to focus his efforts in the long term. "We have accomplished a great deal together over the past few years and I look forward to an exciting future. It would be great to double the number of employees again in the next ten years and then see them reach a 1,000 in the company profile."

MPDV international

The market for manufacturing IT is anything but regional. Naturally, there are one or two local peculiarities, but to compete in the global world of manufacturing, providers like MPDV have to be on the scene all over the world. To meet the demands of particular regions, MPDV offers a wide range of business models, which in the end leads to MPDV being perceived as the market leader.

Hurdles to internationality

Many industrial companies operate not only in one production site, but instead are located in different regions of the world — either in areas where it is inexpensive to produce or where demand for the manufactured products is high. Needless to say, every production site needs manufacturing IT, ideally in the local language. Apart from language issues, there are other regional differences and challenges. These include working time models, legal requirements or cultural peculiarities. All this must be incorporated in the software on the one hand, but on the other the provider of the software needs to be capable of dealing with prevailing conditions. MPDV masters these challenges by taking different approaches.

We know each other

MPDV was founded in Germany. That's why the experts find it especially easy to get to grips with the local culture. Regional differences also exist here, which has prompted MPDV to establish several sales locations and to provide direct, on-site support to the companies concerned. We know each other and are in lively exchange — not least via the HYDRA Users Group (HUG).

Close proximity

Neighboring countries with a common language can be easily served from locations close to the border. Austria is a good example, where numerous hidden champions are located, i.e. companies that play a central role on the world market but whose names are virtually unknown. Their need for state-of-the-art manufacturing IT is met from MPDV's Munich location.

Although Switzerland is also a direct neighbor to Germany, it is a special case due to its multilingualism. In this case, it is a good idea to establish your own subsidiary with headquarters in Switzerland. MPDV thereby ensures a close proximity and cultural understanding.

Common roots

MPDV serves other neighboring countries such as the Netherlands or Poland with its own experts whose roots are in the respective country. Speaking the local language is a great advantage and helps contact persons from these regions to be at ease. Covering the trade press as well as social media in the local language supports the success that MPDV has enjoyed in many European countries. More than 30 customers in Poland alone are testimony to this.

Being on the scene is key

Regional presence is particularly advantageous in places that experts from other subsidiaries find difficult to reach. This is especially true for other continents. MPDV has therefore founded subsidiaries in the USA, Singapore and China, and most recently in Malaysia. MPDV is not only supporting companies headquartered in Germany and with production sites in the respective regions, but also increasingly local companies in America and Asia. The number of international projects involving one or more subsidiaries is steadily growing, underpinning the original requirement for global presence. MPDV is recording significant growth rates, especially in its subsidiaries, even though competition is more intense on other continents.

Working together pays off

Some countries, regions or companies require a local partner who is familiar with the local characteristics — be it the language of the country, having a foothold in industry or simply a good rapport with the customer. For this reason, MPDV launched the MPDV Collaboration Program a few years ago to cater to a wide range of partner com-panies. With this program, MPDV can individually support customers paving the way for the digitalization of production.

One of these partners is Paris-based Inensia, which has been part of the MPDV Collaboration Program since the fall of 2020. This partnership serves the French-speaking market with consulting and services in the field of industrial process digitalization. After an initial joint project at the MERSEN Group, further activities followed, such as a webinar in October 2021. These activities affirmed the need for manufacturing IT in France and at the same time demonstrated the joint expertise of Inensia and MPDV.

Jean-Marie Guerin, Group Business Process Owner at MERSEN confirms: "MPDV and Inensia convinced us with their broad expertise and their profound understanding of our requirements. We are optimistic that because of their wealth of experience and the partnership, we will be able to roll out our new system to our production facilities on time."

"The world is not enough"

As a global provider of solutions for the Smart Factory, it is of the utmost importance for MPDV to serve a broad market. The growing partner network makes a valuable contribution: "We are eager to help many more customers succeed with our expertise and our powerful, worldwide network," sums up Jürgen Petzel, MPDV Managing Director Sales. "Because the world is not enough!"

Successful in the Beverage Industry with KHS

A WELL-REHEARSED TEAM

In 2009 at drinktec, the world's leading trade show for the beverage and liquid food industry, the German-based systems supplier KHS presented a digital partnership unique in the beverage industry: the equipment and machinery manufacturer joined forces with MPDV Mikrolab. Aim of this collaboration was to combine the expertise of the MES software specialist with the expertise of KHS to create a production control system specifically tailored to the needs of beverage producers.

KHS
Filling and Packaging – Worldwide

"The partnership with MPDV gives KHS the opportunity to offer its customers a tailor-made, open industry solution for the beverage sector. Thanks to custom-fit interfaces, seamless integration into the machines is possible and provides the customer with real added value."

Tom Mannheim,
Head of the Line Engineering Product Center and responsible for the Innoline MES product.

The result of these joint efforts was, and still is, the development of the KHS Innoline MES (Manufacturing Execution System) platform featuring the KHS Innoline BLM (Basic Line Monitoring) and KHS Innoline Flex Control (Order Management) modules. These are two modular, industry-specific standard software packages providing a bespoke control and overview of the entire beverage production and packaging process. Bottlers no longer have to decide between an all-purpose application from a system house and a custom-built system from a machine manufacturer: The KHS Innoline MES IT platform brings together the advantages of both worlds. The success of the solution stretching back twelve years is based on the interaction between the IT platform on the one hand and the machine level on the other. Machines not only provide information for the platform, but in turn can also react to information from the system and apply it to the production process in real time.

A recent example of the close partnership are two large greenfield projects realized in the USA in 2021, for which KHS has commissioned a total of ten production lines with an output of 900,000 cans per hour. The KHS Innoline MES, based on HYDRA from MPDV, is used for these production lines. Specially developed bidirectional standard interfaces in the machines ensure end-to-end integration from the ERP system to the lines. Production orders can now be transferred from the enterprise resource planning and produced in the filling lines —

SHORT AND SWEET — HIGHLIGHTS

KHS INNOLINE MES FOR TWO GREENFIELD PROJECTS WITH TEN LINES HANDLING 900,000 CANS PER HOUR

- Connection to the customer's ERP systems to transfer and upload production orders
- Multi-stage production planning with Shop Floor Scheduling and a direct connection of can filling lines to a multi-packing line (Variety Pack)
- Connection to customer logistics systems to generate transport orders for self-propelled transport systems (AGV/LGV)
- Tracking & tracing for packaging and auxiliary materials including automated consumption uploads into the ERP system
- Line management functions featuring presetting of machine programs as well as automatic changeover of subsystems for container and packaging coding and pallet labeling
- Integration of MES screens for line management into machine operation
- Standardized interfaces for line monitoring and line management in machines providing reliable control functions

Source: KHS GmbH/Frank Reinhold

supported by the operators. For example, the MES system automatically sets up the coding and printing systems for the articles to be produced. It also generates transport orders based on the BOM. Self-propelled LGVs (laser-guided vehicle) then supply materials to the line.

Flexible data hub

Innoline MES runs as an open and modular solution at the customer's site. The modular, flexible infrastructure and the open interfaces of MPDV's HYDRA system provide the foundation for a highly cooperative platform. It can accommodate the customer's specific requirements and concepts, and gives them the freedom to combine other bespoke systems with each other. The beverage producer thus gains a data hub that can be flexibly expanded to include KHS as well as third-party solutions.

Thanks to the choices offered by HYDRA, the usual disadvantages and limitations of standard solutions for the industry are no longer an issue. Adapting the system as a KHS Innoline MES provides the platform operator with a solution that perfectly suits the beverage industry and integrates key functions. The IT solution realizes its full potential by integrating it into machine technology. Depending on the expansion stage of the KHS Innoline MES, KHS machines are equipped with suitable MDI LM (line monitoring) and/or MDI OM (order management) standard interfaces. Individual areas therefore acquire the ability to respond to external commands from the MES system. A mere monitoring or reporting system is transformed into a proactively acting line management system that closes the existing gap between the ERP system and the production environment.

Getting started

For customers who want to take smaller steps towards the Smart Factory, the platform offers an alternative with the KHS Innoline BLM (Basic Line Monitoring), which greatly simplifies the transition towards a fully-fledged MES system. The BLM module incorporates the software infrastructure required for further retrofitting. This system performs all the functions of a modern line monitoring system, which can be displayed and analyzed on any end device with the help of a web interface.

In a step-by-step process specially designed for the individual customer, the BLM module can be upgraded module by module to become a complete MES system for production control. Solutions for daily challenges can be retrofitted or enabled on a module-by-module basis with the Innoline MES platform. This includes order management, the integration of LGVs for automated intralogistics, tracking & tracing of material and utility consumption, and preventing changeover times by using intelligent production planning or proactively controlled changeover processes, to name just a few applications.

KHS and MPDV can each look back on a long history in their respective fields: In 1868 the predecessor company of KHS was founded, and the IT specialist in 1977 — together they can look back on a history of almost 200 years as drivers of innovation. The experience and know-how are equally extensive and have come together in a success story that has now lasted twelve years and will remain so in the future.

THREE QUESTIONS TO FELIX PLÖTZ

Felix Plötz is an entrepreneur, author and keynote speaker. His motivation is to encourage people and inspire them to make changes. Speaking at the Smart Factory Week, his presentation "Change or Chance" showed that a doer is hidden in each of us.

What's possible today that was simply unimaginable 20 years ago?
A lot of things! And we don't have to go back 20 years by any means. The iPhone was launched in Europe at the end of 2007, barely 14 years ago. I didn't even buy my first smartphone until a few years later. Nowadays, I can't no longer imagine traveling without these conveniences: Real-time data for my train connections, Internet everywhere, PDFs on my cell phone, meditation via an app in between, etc. Digitalization has most definitely become a very central part of our everyday lives.

Always-on or digital detox at times?
In my case, neither! I try to strike a good balance in everyday life so a full-on detox isn't necessary in the first place. And usually it works quite well :-).

Favorite pastime outside the digital world?
Spending time with real people — with my family, friends or at the sports club.

Source: Heiner Hänsel

Live from Mosbach to the world

SUCCESSFUL SMART FACTORY WEEK

MPDV organized the Smart Factory Week for the first time in September 2021. The online event delivered all relevant info on digitalization and Smart Factory in one week. Attendees were informed in presentations and discussions on how to advance to the Smart Factory. They could also share experiences, discover innovative strategies, and discuss topical Industry 4.0 issues.

SMART FACTORY WEEK

What was once a meeting room with a conference table and chairs is now a TV studio during the Smart Factory Week. A green screen fixed to the wall. Video lights set up and aligned. The mixing console plugged in. Presenters and speakers raring to go and the direction giving the all-go. Ready for five days with 20 different sessions and around 2,500 registrations.

Why is future-proof manufacturing IT so important? How does artificial intelligence support manufacturing — and why are people still important in the factory of the future? These were the key questions that MPDV experts, customers and guests from companies and science addressed before the camera, sharing their knowledge and experiences. One of the highlights was the keynote speech by the renowned author and speaker Felix Plötz. His topic "Change or Chance: Recognizing Change, Shaping the Future." provided one or two eureka moments for the audience.

FIVE DAYS — FIVE MAIN ISSUES

Each day focused on a different topic, which thrilled the attendees: "The breakdown into focus days — from the introduction to digitalization on Monday, to cloud and edge, platforms, artificial intelligence (AI) and finally the challenges of digitalization on Friday — meant that you could approach the subject of the Smart Factory step by step," reported one attendee.

Besides presentations and discussions, attendees were able to visit digital booths from MPDV, Dell and Viastore throughout the week and interact directly with speakers and partners in dedicated meeting spaces. "The Smart Factory Week was a stimulating and interesting week. Although we have a few exhausting days behind us, the great response and especially the positive feedback have convinced us that this online event was the right move and holds great potential for us to think about a Smart Factory Week in 2022 as well," sums up Nathalie Kletti, CEO at MPDV.

The homepage of Smart Factory Week was modeled after MPDV's headquarters in Mosbach.

At MPDV's Smart Factory Week, everything was about digitalization and Industry 4.0.

HYDRA X

FROM PRODUCT LAUNCH TO BEYOND MES

MPDV has set a milestone in manufacturing IT with HYDRA X but what makes HYDRA X so unique? How does HYDRA X help companies on their way to the Smart Factory?

The Smart Factory is on everyone's lips today, but there is no consistent definition. However, there is a growing consensus that the Smart Factory needs standardized solutions, despite being highly individual itself. This leaves only one option for software providers: they need to develop solutions that are extremely flexible and capable of being combined with applications from other providers. The previous approach of "everything from a single source" is becoming more and more marginalized. MPDV has anticipated this market development and launched HYDRA X in spring of 2021, a product that will perfectly meet the requirements of the Smart Factory in the coming years. As an innovative successor in the HYDRA family, HYDRA X offers a wide range of supporting applications for modern manufacturing that go far beyond the classic functional scope of a Manufacturing Execution System (MES). Among these applications are functions to control intralogistic processes or a step-by-step operator guidance for assembly processes. The new applications intervene to a greater degree in the process control than was ever envisaged for a classic MES. HYDRA X therefore ushers in the era of Beyond MES.

The new applications intervene to a greater degree in the process control than was ever envisaged for a classic MES. HYDRA X therefore ushers in the era of Beyond MES.


AI

MEET REQUIREMENTS, USE ANALOGIES

The Manufacturing Integration Platform forms the basis from a technical point of view. A variety of applications from a range of suppliers can be docked onto the MIP without any problems. The result of this interaction is a highly individual manufacturing IT system that differs from company to company and precisely meets individual requirements.

Let's use the image of the contour gauge from a wood workshop to illustrate matters even further. A contour gauge allows to copy angular and round shapes and to transfer the copied shapes to a counterpart. The way a contour gauge works is simple but still ingenious. It resembles a comb with a long row of thin pins. When pushed against an object, the pins conform to the object's shape creating a perfect mold once the pins are fixed. By transferring the copied shape, you get a perfectly fitting counterpart.

This principle can be applied to manufacturing IT and HYDRA X in particular. The existing shape where the counterpart needs to be fitted corresponds to the existing manufacturing IT. We rarely find a blank canvas in manufacturing IT and have to accept prevailing conditions. To make matters worse, IT solutions are often homegrown, pieced together, and create data silos. This makes it all the more complex to introduce a new IT solution capable of working with these systems.

Let's go back to our contour gauge. First of all, it records what is already there — to retain the analogy: the nature of the shape. Once this shape is fixed, an IT solution is needed that can replicate this shape as accurately as possible.

The MPDV executive board outlines what users can expect from HYDRA X:

"The MIP ecosystem and HYDRA X create a win-win situation for all parties involved. On the one hand, HYDRA X contributes many field-tested apps to the MIP ecosystem. On the other hand, the ecosystem enhances HYDRA X because specialized applications can be connected easily. This in turn is a big advantage for our customers, who can now access a much wider range of functions — made possible by interoperability. Consequently, HYDRA X also delivers a sense of serenity to the turbulent world of manufacturing IT and the Smart Factory."

Nathalie Kletti,
Chief Executive Officer

SMART IT FOR THE SMART FACTORY

This is exactly where HYDRA X comes into action. The software consists of many flexible Manufacturing Apps (mApps) that work together via the Manufacturing Integration Platform (MIP). The user can select from numerous applications and combine exactly those that fit their manufacturing and IT. However, MPDV's mApps are not the only ones that can be used — thanks to the semantic information model of the Manufacturing Integration Platform, mApps from other providers can also be operated without any problems via plug-and-work. This guarantees even more flexibility and consequently security for the future.

All you need now is someone who can handle the innovative tool and come to the right decisions: That's what MPDV's services are for. Experienced consultants and experts with a broad practical knowledge conduct inspections of the production halls of interested companies every day and develop roadmaps to the Smart Factory together with the future users.

THE NEXT STEP TO THE FUTURE

Today, hardly any production company is competitive without manufacturing IT. The integration of complex requirements in terms of product variety and process quality alone makes the use of a future-proof manufacturing IT system indispensable — especially in a Smart Factory. HYDRA X and the underlying open platform architecture of the MIP also enable companies with existing systems to gradually migrate and ultimately use innovative applications.

"HYDRA X is the answer to the question about transforming production into a Smart Factory. The step into digitalization becomes now simpler and easier to accomplish. The compilation of functions as well as the costs are manageable, clear and transparent. Companies start where the need is greatest and where the return on investment (ROI) can be achieved very quickly. We offer HYDRA X as Software as a Service (SaaS) for even more flexibility and freedom for users."

Jürgen Petzel,
Chief Sales Officer

With HYDRA X, manufacturing companies are well prepared for the future. Our proven combination of user proximity and a flair for beneficial innovations is also manifested in the new generation of manufacturing IT from MPDV.

"With HYDRA X, we have arrived where the market needs us today and in the coming decades, which is the age of apps, platforms and ecosystems. The individual manufacturing apps (mApps) of HYDRA X communicate directly with the Manufacturing Integration Platform (MIP) and can be flexibly combined with each other and with mApps from other providers. Needless to say, there is also interoperability with our APS FEDRA, which has already been running as mApp based on the MIP since its launch in 2020. Appification of manufacturing IT is a milestone we are setting with HYDRA X."

Thorsten Strebel,
Chief Technical Officer

**Interested?
Click here for the product video:**

HYDRA X in Use

BUILD YOUR FACTORY SMART!

"HYDRA X was implemented in our production in a very short time thanks to the high degree of flexibility provided by MPDV. Our machinery is now digitally integrated and completely transparent. Real-time data transfer guarantees a continuous monitoring of our production processes and enables us to quickly react and optimize processes to achieve efficient results."

Klaus Wölk, plant manager
at MOESCHTER GROUP GmbH

MOESCHTER GROUP

The MOESCHTER Group, founded in 1992 as a family-owned business, is committed to the development, production and distribution of high-performance materials. The company delivers its products and solutions made of high-performance and dental ceramics as well as engineering plastics to customers from different industries all over the world. The MOESCHTER Group dedicates itself to engineering and excels in developing individual solutions for their customers. The medium-sized company, headquartered in Dortmund, Germany, employs around 180 people.

HYDRA Success Story Salinen Austria

SUCCESSFUL DIGITALIZATION OF AN ANCIENT TRADE

No matter how far back a company's history goes, there comes a time when it is inevitable that processes need to be digitalized. Salinen Austria AG reacted early and is now on track to become a Smart Factory. The Manufacturing Execution System (MES) HYDRA from MPDV is on board assuming an increasing number of important tasks.

Digitalization of the manufacturing process

From raw material to the salable end product, Salinen Austria has the following processing steps: brine extraction (i.e. washing out the salt) in the mine, purification of the brine, evaporation of the water and drying of the salt. The salt is then either sent to one of the warehouses, which can hold a total of some 300,000 metric tons, or to final production, where it is packaged directly or mixed with other ingredients. Salinen Austria uses a number of software systems to keep an eye on this production process, and among them MPDV's Manufacturing Execution System HYDRA plays a special role — monitoring final production.

The product diversity, which has grown strongly over the years, inevitably leads to a changeover from stock production to customer-driven production at Salinen Austria. Today, a sophisticated production planning system manages all customer orders, compares them with current stock levels and feeds the resulting requirements directly into the ERP system by issuing a production order. The ERP generates from these production orders a weekly rolling scheduling, which is then transferred to the MES HYDRA. All packaging systems in the final stage of production are connected to HYDRA. Furthermore, individual field sites are connected to the central HYDRA system and this connection fulfills several tasks: Assigning production orders arising from scheduling and collecting relevant data for evaluations. In addition, the collected data can be used to provide product traceability.

You can't make anything out of nothing

MES HYDRA has been in action at Salinen Austria since 2001. In 2019, the decision was made to relaunch HYDRA with version 8. Dietmar Quatember, IT Manager at Salinen Austria, explains: "We are talking about a relaunch and not an upgrade because we deliberately wanted to completely rebuild the new system from scratch to avoid the transfer of existing issues. This enabled us, on the one hand, to rethink the processes and to even improve them. On the other hand, we had planned to introduce HYDRA 8 as close to standard as possible."

Salinen Austria pursued the following objectives with the relaunch:

1. Increasing the degree of automation in production
2. Optimizing production processes
3. Reducing errors
4. Unique identification of pallets
5. Ensuring product traceability
6. Calculating KPIs for production control

However, there were various challenges — first and foremost the change management. "You can't imagine how hard it is to convince an employee who has been responsible for a process for years that is now changed and, most importantly, digitalized," Quatember elaborates. In addition, there were technical challenges involved in integrating the new MES into the heterogeneous system infrastructure consisting of ERP, process control system and plant control systems. Here, they also decided to start anew. Old connections were not carried over and instead advanced technologies such as OPC UA were used to connect the systems. Last but not least, existing master data had to be checked and updated so that planning and optimization could proceed on a realistic data basis.

HYDRA 8 was introduced in 2020 with the modules Machine Data, Shop Floor Data, Material & Production Logistics, Tracking & Tracing, Workforce Planning and In-Production Inspection after about six months of preparation and conception.

In the middle of the Salzkammergut region, Salinen Austria uses state-of-the-art technology to produce a vital product: salt. (Source: Monika Löff)

Success is in the detail

How HYDRA is actually used can best be explained by looking at the route of a pallet from production to the warehouse. "All starts with an operation," explains Quatember, "which means we had to learn to divide our processes into meaningful sub-steps that we could then map as operations in HYDRA." What was initially more than 20 operations became just five with the introduction of HYDRA 8. This reduces the complexity enormously. Today there are the following operations: mixing and pressing, filling, case packing, palletizing and storage. A production order consolidates the individual operations. This allows to evaluate all collected times and quantities as required.

Salinen Austria has been extracting salt from the Austrian mountains for over 500 years.
(Source: Andi Bruckner)

Each pallet begins its journey with a production employee selecting the first operation from a master list and logging it on. In doing so, the operator logs on the material as lots and also themselves in addition to the actual work process. This allows to subsequently track which lots have been processed and by whom. Now the real work can begin. HYDRA continuously collects the produced quantities with the OPC UA machine connection and visualizes them for the operator directly on the machine terminal — paperless. Any malfunctions and interruptions are automatically detected or reported by the operator in HYDRA. "I also recommend not overdoing it when it comes to creating machine status reasons and instead using fewer but more meaningful reasons for malfunctions," adds Quatember, "too much detail only makes the whole thing confusing."

Just in case

Provided everything goes according to plan, the machine then continuously produces the specified article and HYDRA generates an output lot number for each pallet. Each pallet can be clearly identified by the lot number generated by HYDRA — even outside the HYDRA system boundaries. For this purpose, HYDRA also transmits the generated lot numbers to the warehouse system and the shipping automation system.

Each pallet passes through a so-called wrapper, which wraps the pallet with foil and applies a standardized label with all

Salinen Austria AG can store around 26,000 pallets of packed salt in addition to 300,000 tons of loose salt. (Source: Salinen Austria)

Thanks to lean shop floor terminals, production staff can operate the MES HYDRA directly at the machine. (Source: Salinen Austria)

All machines and systems of the final production are connected to the MES HYDRA at Salinen Austria. (Source: Salinen Austria)

With MES HYDRA, Salinen Austria can control its production processes at all times. (Source: Salinen Austria)

relevant product data — including the lot from HYDRA. It then moves on to the automated inspection station. Along with the dimensions and weight of the pallet, the fork clearance is also checked here to avoid any surprises when the pallet is later put into storage. Faulty pallets are rejected.

In the final operation, the pallet is placed in the automated high-bay warehouse and HYDRA sets the pallet status to "pass" or to "inspection". The latter is particularly important for pharmaceutical salt, as this must be tested again in the laboratory before delivery. After posting to the ERP, the goods are available and can be sold and delivered.

Invisible helper

HYDRA supports the daily production routine in the background with various calculations and functions that provide data. For example, material consumption is continuously posted to the ERP, so you can always see when new packaging material needs to be purchased, for example. At the same time, all data on used materials is transferred into the traceability applications of HYDRA 8. Here you can track which input lots have gone into a particular end product (top down) and, in turn, which end products incorporated a particular input lot (bottom up). For this purpose, HYDRA offers a graphical display, the so-called batch tree. "This is hugely important for our table salt and pharmaceutical salt production, so we can react quickly in the event of complaints and identify any batches that may be affected," says Quatember.

The role of employees

HYDRA supports personnel scheduling for all employees in the production department at Salinen Austria. This includes intelligent shift pattern models and a qualitifcation matrix managed in HYDRA. "We used to have to create shift schedules every year," reports Quatember, "with HYDRA 8, it all works automatically — fantastic!" The qualification matrix stores which tasks can be performed by specific employees and where they should be assigned primarily. The shift schedule and the qualification matrix from HYDRA are automatically transferred to the production planning tool. This tool undertakes an optimized workforce deployment by distributing workstations as part of the detailed order planning process.

The big picture

HYDRA is not alone at work at Salinen Austria. The basis for the integration into the existing IT environment are the standardized yet flexible interfaces of HYDRA. For example, the ERP connection is made via a standard interface. Most systems in production are connected via OPC UA — as is the B&R's process control system.

Other systems, such as the production planning tool, are connected via configurable interfaces and systems like the reporting tool, access the HYDRA database directly and read out data for the monthly report, which can then be generated at the push of a button. Production quantities, machine utilization, malfunctions and shift performance are evaluated here, which are then used to calculate premiums. This means that the controlling department can always access current data.

Lessons learned

Dietmar Quatember is delighted with the results of the HYDRA 8 implementation and concludes: "We could not have done it without the early involvement of all departments concerned and the support of the management, which is imperative. That's why I strongly recommend that anyone who is introducing an MES should include a change project in their venture. Examining all processes down to the smallest detail also helped us a lot. Subsequently, we also discovered potential for improvement."

In addition, Quatember points to a living error culture — especially in cooperation with day-to-day production. After all, you can learn from any error if you let it happen. "Stay as close to the standard as possible and start training your key users early," advises Quatember, "we are very grateful to MPDV for their recommendation." In conclusion, he again emphasizes that interfaces should be designed as simple as possible and documented instantly.

Nothing stays the same

What they also learned is that you can never have enough MES applications and therefore, Quatember is already planning to further expand HYDRA at Salinen Austria. In a first step, shop floor scheduling with HYDRA is to be introduced. Detailed planning from the company's own planning tool should be visualized to enable users to react quickly to disruptions or changes. HYDRA also offers functions to simulate various planning scenarios, which Quatember expects to be of great benefit.

Another expansion of HYDRA is aimed at quality inspections. Samples that have to be sent to the laboratory for analysis shall be added to existing production tests. Measuring equipment with a digital interface should also be directly connected to HYDRA to reduce manual input and potential errors. Besides, the complete incoming goods inspection is to be mapped with HYDRA in the medium term. Salinen Austria is currently working on integrating HYDRA 8 into the validation of production processes in accordance with GMP — certainly a complex but nevertheless necessary project in order to supply future products to regulated markets.

Quatember draws a conclusion and summarizes his experience with HYDRA as follows: "I consider HYDRA as a toolbox. Our product range is quite wide and different customer requirements demand high flexibility. HYDRA made our production so flexible that we were able to switch from stock production to customer-driven production planning. This would certainly not have been possible without HYDRA."

About Salinen Austria

Salinen Austria AG is one of Europe's leading salt producers and currently employs around 520 people in Austria and at its eight sales offices in Central and Eastern Europe. Four million cubic meters of brine are extracted annually at the sites Altaussee, Hallstatt and Bad Ischl in Austria producing 1.2 million tons of salt. The use of salt as a resource extends far beyond the food sector — both in domestic and industrial applications.

Performance Management with FELTEN PILOT:MES

SIKA'S ROAD TO DIGITALIZATION

Tile adhesives, fillers, adhesives: When it comes to chemical construction products and industrial sealants and adhesives, it's all about Sika Deutschland GmbH.
The company is one of the world's leading suppliers in this sector, filling more than 200,000 metric tons of various products annually at its Rosendahl site alone. The Manufacturing Execution System PILOT:MES from FELTEN guarantees a continuous flow of the filling systems.

A manufacturing process without downtimes and waste — what company doesn't dream of that? It's Sika's mission to come as close as possible to an ideal manufacturing process. The company started the digitalization process eight years ago to achieve this goal.

MES in the system environment

Unlike many other companies where the ERP and MES operate with the shop floor, Sika does it differently. Here, a process control system (PCS) plays a central role and starts and stops all production activities such as filling, mixing or switching orders. The ERP only provides the master data.

The PILOT:MES Manufacturing Execution System from FELTEN at Sika's Rosendahl site guarantees that the filling process is in continuous flow. (Source: Sika)

"Downtimes lasting five minutes or more are recorded as events. Since each of these disruptions has an impact on availability, this data is critical to determine the Overall Equipment Effectiveness."

Parallel to the PCS, the Manufacturing Execution System PILOT:MES from FELTEN was set up to map the performance and evaluate the data later. This requires detailed knowledge of the machine's performance. For this purpose, the machine cycle is recorded with a photoelectric sensor, and the corresponding signal is transmitted to a database server with a counter module. The server is home to the MES installation and thus the heart of the system: This is where the order and product data are linked with performance data. Calculations are also handled here. Calculations make it possible to operate the Visual Factory at Sika, i.e. displaying actual performance data on large screens in the production halls.

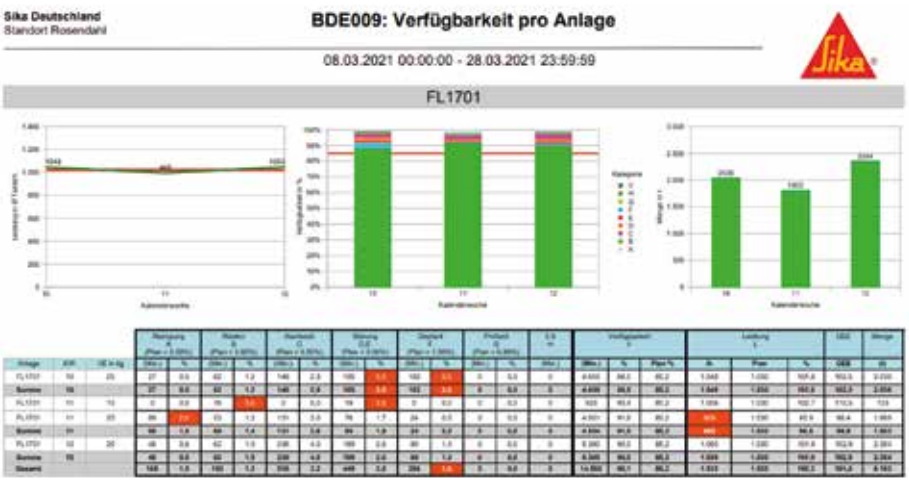
The MES at work

The FELTEN software tracks all machine running times, cleaning and setup times, but also technical malfunctions. Downtimes lasting five minutes or more are recorded as events. Since each of these disruptions has an impact on availability, this data is critical to determine the Overall Equipment Effectiveness. Performance is evaluated based on minor interruptions, for example microstops due to packaging changes.

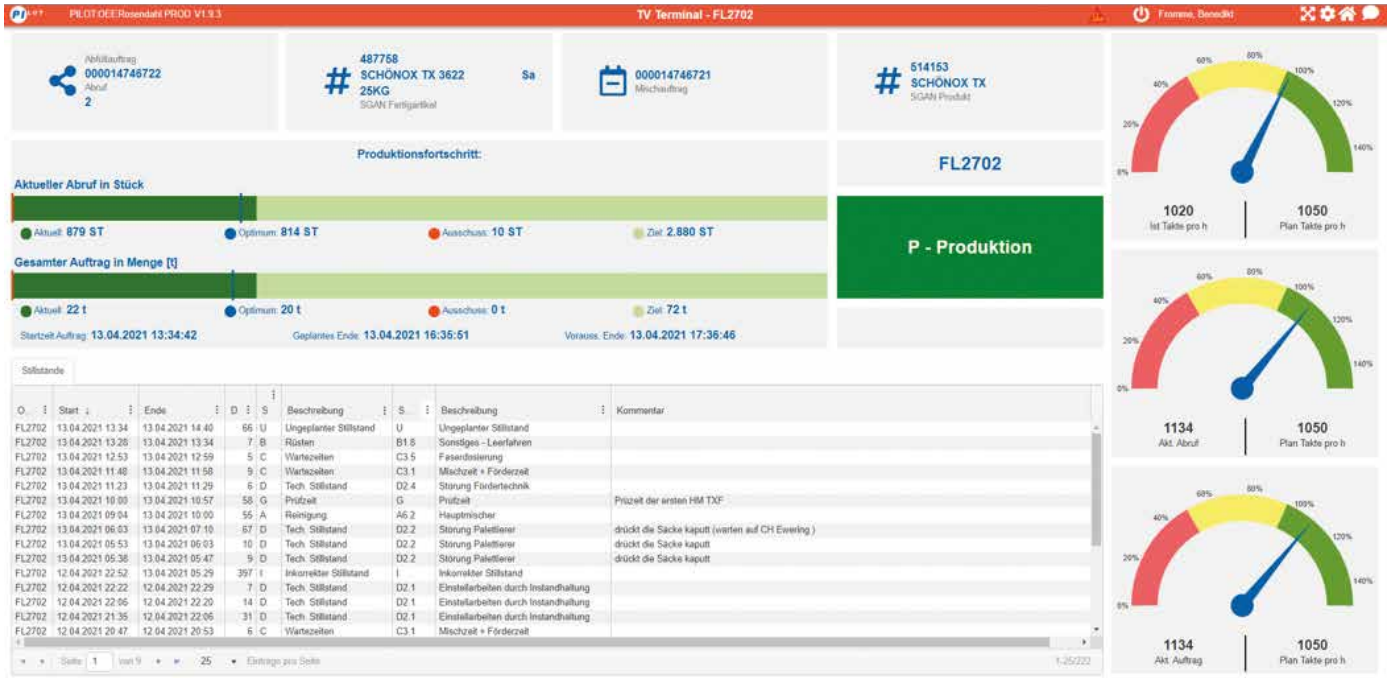
MOTIVATION

Starting from the central question of what the company would like to achieve with a Manufacturing Execution System in the first place, Sika determined the status quo and the target state of production. Let's summarize the result as follows:

- **Overall Equipment Effectiveness (OEE):** Maximum availability is achieved at maximum performance. At the same time, the quality loss is kept to a minimum.
- **Goals:** Annual or departmental targets are defined. By storing the targets as planned values together with a threshold value in PILOT:MES, countermeasures can be taken in good time if the target value is exceeded or not reached.
- **Continuous Improvement Process (CIP):** The success of an optimization project is tracked. For this purpose, Sika uses a reporting system that allows for data to be analyzed and post-processed.
- **Paperless:** Data is available digitally. Handwritten machine cards that were imported into Excel spreadsheets by the shift supervisor, uploaded to a BI system overnight and not available in digitized form until the following day are a thing of the past.
- **Live:** Data is available in real time. If you enter setup, maintenance or malfunction times on an operator terminal, this data is directly displayed.
- **Transparency:** Everyone is informed about actual performance. Sika was keen to involve its employees from the very beginning. Everyone can see the performance on large TV monitors in the production area. The Visual Factory is used to motivate and inform employees.



Sika evaluates all performance data in regular reports to identify and exploit optimization potential. (Source: Sika)



The operator terminal displays order and product data ranging from the number of pieces to the production progress with bar graphs and tachographs. (Source: Sika)

Before the software was implemented, machine operators noted such stops by hand at best. A reliable evaluation of data and well-founded information about the performance were not possible. PILOT:MES now generates the necessary transparency in production and shows it on the operator terminal. The solution enables the operator to instantly detect where action is required. For example, one of their tasks is to classify events such as the setup of a machine. After all, only when this information is fed into the software can detailed evaluations be made later. The operator terminal displays order and product data ranging from the number of pieces to the production progress with bar graphs and tachographs.

Sika evaluates all performance data in regular reports to identify and exploit optimization potential. A combination of graphical displays and data tables has proven successful. Deviations from the target value are automatically highlighted in red in the data table, making outliers immediately visible. The performance in cycles per hour is also critical for reporting and visualized in a line chart. As the benchmark is also stored here, the user can see immediately if everything is running smoothly. Bar charts also show the availability and the quantity produced. Sika can now use this data to specifically identify when something is not going according to plan. Patterns that indicate production failures can be identified at an early stage and employees can take preventive countermeasures.

Visual Factory: Actual performance is displayed in real time on large screens in the production halls. (Source: Sika)

About Sika

Sika Deutschland GmbH is a subsidiary of Swiss-based global player Sika AG and one of the world's leading suppliers of chemical construction products and industrial sealants and adhesives. Sika Germany is also committed to identifying ways and solutions to make construction sustainable in terms of water management, energy conservation and climate protection. The company has around 2,200 employees at nine locations in Germany.

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Operation of manufacturing IT

THINGS GET EASIER WITH THE CLOUD

MPDV has been offering Smart Factory Cloud Services for a good year. The MES HYDRA can be operated simply as Software as a Service since then. This makes operation much easier for customers, as shown in the following fictitious conversation among three users of different Manufacturing Execution Systems (MES).

SMART FACTORY CLOUD SERVICES BY MPDV

What solutions are offered as SaaS?

- Manufacturing Execution System (MES) HYDRA
- Advanced Planning and Scheduling System (APS) FEDRA
- Manufacturing Integration Platform (MIP)

What are the terms and conditions?

- Selection from standard packages of the respective solution
- Monthly payment
- Minimum term twelve months
- Optional services to connect external systems and equipment

During a virtual exchange at a regional trade association, representatives from three medium-sized manufacturing companies talk about their concerns and difficulties in operating IT systems. Mr. Cruise and Ms. Cooper have basic IT knowledge and manage the manufacturing IT including the MES. Mr. McAllen is a trained system specialist and IT manager in a manufacturing company — and relies on the MES HYDRA from the cloud.

Mr. Cruise, the career changer, explains: Since we introduced an MES, production has been running much better, but I have to deal with IT on an almost daily basis. The system itself runs stable, but I get constant updates and hotfixes for the server's operating system and also for the database — this is really annoying as my main focus lies on production.

Ms. Cooper, the all-rounder, agrees: That's similar at my place. I don't work directly in production, but I still look after our MES. I thought I knew something about computers, but a server is a different story altogether. Updates galore and on top of that the administration of the user rights.

Mr. McAllen, the expert, muses: I know these problems all too well — with the difference that IT is my absolute passion. We used to have the MES server located in our own data center and I handled everything. But that's been a thing of the past for a few months now. Our MES is now running in the cloud. Here, the supplier deals with the updates, hotfixes and all the user rights stuff.

The career changer: Sounds exciting! How does it work? Is this still your MES — or do you use it together with other companies?

The expert: We didn't buy the MES as usual, but pay a monthly usage fee and we have a dedicated system instance. This means, only we have access to our data. That was paramount for our management. Our new system works on the principle of Software as a Service — SaaS. MPDV provides us with the MES and takes care of everything necessary for a stable system operation. This takes enormous pressure off me and I can once again focus more on the real problems of our users.

The all-rounder: You mean the MES server runs in the cloud? But what about the clients in the office, on the shop floor, and most importantly, how does the collected machine data get to the MES?

The expert: Clients continue to run locally and communicate with the MES server via the Internet. We hardly notice a difference in performance. We collect the machine data via a central computer in the control cabinet — an edge gateway. This is a standard computer running a service that collects data from machines and equipment and forwards it to the MES server in the cloud. A kind of buffer ensures that production can continue for both the shop floor clients and the machine data collection even if there is a problem with the Internet connection. So far, it has only happened once, but everything worked perfectly. No one on the shop floor noticed that the Internet was down for almost an hour.

The career changer: So you still have part of the technology in-house, but the server is in the cloud. That sounds practical. Can employees in the office, for example the supervisor, continue to run evaluations and also print out data?

The all-rounder: More importantly, how does the connection to the ERP system work?

The expert: First of all, the supervisor doesn't realize he's talking to the MES server in the cloud. Everything's the same for the supervisor and other employees — just as it all were located at your own company. And yes, ERP connectivity is definitely an important issue. Again, there is hardly any difference to the on-premise installation of the MES. The server in the cloud can be accessed simply with an IP address. Consequently, interfaces to other systems continue to function as usual — even to the ERP. Do you operate the system yourself in your own data center?

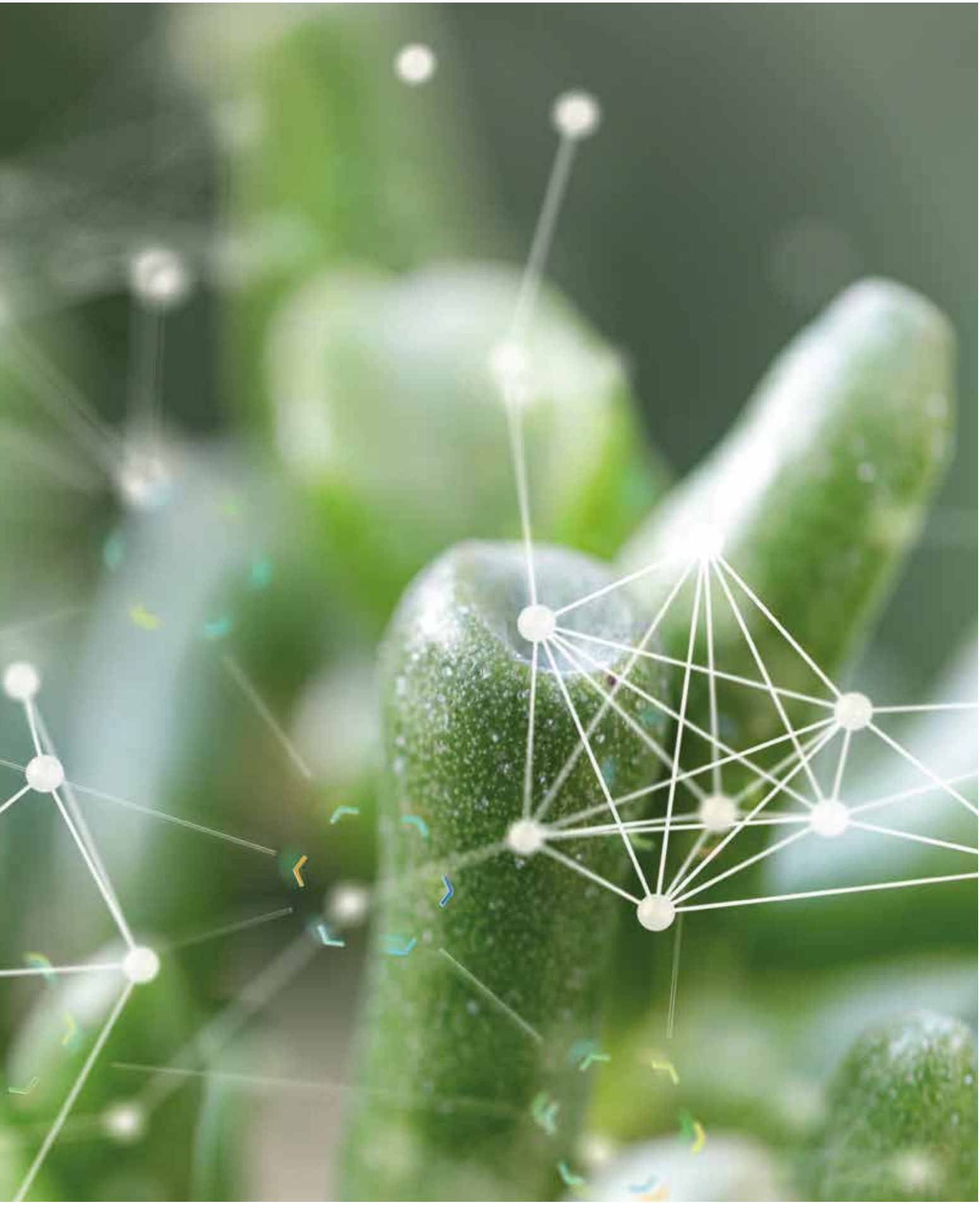
The all-rounder: That remains to be seen as we are about to implement an ERP system. The decision as to whether locally or in the cloud has not yet been made. What would be better?

The expert: Bear in mind that you also have to operate an ERP server. This makes little difference for MPDV's ERP-MES interface as they offer an ERP Cloud Connector that also connects ERP systems in the cloud to the MES. This cloud connector also works with the cloud MES — quasi a cloud-to-cloud communication.

Manufacturing Integration Platform (MIP)

LONG LIVE THE ECOSYSTEM!

According to a Bitkom study, 63% of the companies surveyed see digital platforms as an opportunity. This picture is backed up by the many offerings on the market. It is estimated that there are more than 500 different platforms for the manufacturing industry alone. But what characterizes a platform for manufacturing?



The MIP manages the integration of many systems without having to implement countless interfaces.

Industry needs manufacturing IT to be able to plan and produce efficiently. In contrast to monolithic systems, platforms appear to be much more open and also provide a home for applications from third-party providers. As a result, the usual vendor lock-in is reduced and manufacturing companies gain more flexibility.

The MIP is different

The platforms most frequently used in production are IoT platforms. These platforms are used to collect, store and evaluate large amounts of data — but that wasn't enough for MPDV. The difference to the Manufacturing Integration Platform (MIP) is not only evident in name.

The Manufacturing Integration Platform integrates many manufacturing systems, which is vital in the age of Industry 4.0, where the number of systems is continually growing. After all, as the number of systems increases, so does the number of interfaces. That's exactly where the MIP Integration Platform comes in. The core of the platform is the Virtual Production Reality (ViPR). The ViPR contains a semantic data model that includes both static and dynamic details about all objects in the production. These objects contain things like machines, tools and material as well as orders and other virtual objects. All applications of the integration platform MIP have access to these objects and share the same data basis and a common information status. In this way, the MIP manages the integration of many systems without having to implement countless interfaces. For this reason, we speak of interoperability.

MIP

Communication with the Manufacturing Integration Platform and the semantic data model takes place via proven methods such as REST-based web services and common automation protocols such as MQTT, which are valued by developers. Integrated security functions and interfaces available to the shop floor and all common ERP systems are also instrumental to the success of the MIP platform. Both interfaces and the actual business logic can be easily modeled using low code.

Benefits for all

Experience with the MIP so far shows that every participant in the ecosystem can benefit. mApp providers offer specific solutions for the MIP while integrators can choose from the wide range of available mApps. Users, mostly manufacturing companies, will then get the best overall solution tailored to their needs. In any case, development and integration costs are reduced with the MIP functioning as an integrative interface.

The partners from the MIP ecosystem offer both ready-made apps and services for developing individual apps. The much-criticized vendor lock-in is no longer an issue, as the MIP provides a basis for greater flexibility and diversity.

You might think that MPDV is creating additional competition for itself. On the contrary — MPDV is expanding its own portfolio of services by cooperating with competitors and working together to create more flexibility in the Smart Factory.

And then came HYDRA X...

MPDV's Advanced Planning and Scheduling System (APS) FEDRA already features mApps that run on the MIP. Following, MPDV launched the successor to HYDRA 8 on the market in spring 2021: HYDRA X. Like FEDRA, HYDRA X consists of numerous mApps that can be combined in any way. The mApps collectively cover a range of functions that goes far beyond a classic Manufacturing Execution System (MES). With these products, MPDV offers a platform and a wide range of platform-based applications for the Smart Factory.

HYDRA X

Read more about HYDRA X on page 46.

New features of the MIP 2

Technological progress has also been made with the MIP Integration Platform. Version 2.0 features an integrated UI Provider. mApps can use the UI Provider to give user interfaces (UI) a uniform look and feel. You can use the UI Provider to create user interfaces for all types of devices, from smartphones to large hall monitors. HYDRA X also uses this service.

Another innovation is a simplified way to sign up for the MIP. As of version 2, you can use already existing and verified accounts — e.g. a Google account — via openID Connect.

Access to the microservices of the MIP is further standardized with the help of openAPI. Version 2 also simplifies the connection of apps that were not specifically developed for the MIP.

MIP Marketplace revamped

In recent months, the number of providers on the MIP Marketplace has increased significantly. In addition, MPDV itself is now also offering a large number of mApps, so the MIP Marketplace website has been completely redesigned. Today, visitors can find a wide range of mApps, services and compatible hardware on the site, which can be conveniently filtered and searched.

The new Marketplace also occupies a much more central role on the MPDV website, allowing solutions from partners in the ecosystem to be displayed more prominently. This delights the partners on the one hand, and on the other hand ensures that the ecosystem is perceived as a living network, which is growing continuously.

More mApps from the MPDV group of companies

The FELTEN Group also delivers a first mApp for the MIP with the application "Digital Checklists". Further mApps are planned and will gradually enrich the ecosystem.

Business model of the integration platform MIP

Platforms have long been on the road to success in the B2C environment with their importance growing in the B2B environment as well. Japanese and German experts have analyzed and evaluated which platforms fulfill the requirements of the manufacturing industry and how their business models work. Their outcome and evaluation have been summarized and published in the result paper of the Platform INDUSTRIE 4.0. The analysis also includes the Manufacturing Integration Platform (MIP) by MPDV as one of the key platforms from Germany.

The paper is available for free download:

mpdv.info/industrie40

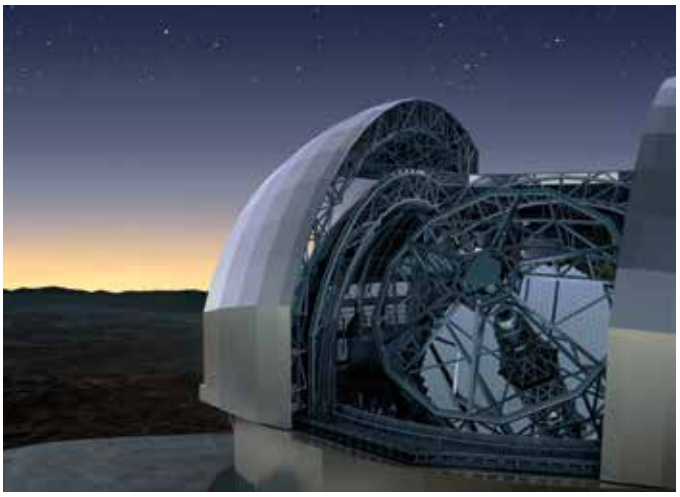
FELTEN

Member of the MPDV Group

Read more about FELTEN as a member of the MIP ecosystem on page 70.

Manufacturing Platform for the Future

SCHOTT GOES FOR THE MIP



Source: SCHOTT AG

"Our focus in the selection process was on implementing a platform that already covers the majority of our requirements in the standard version. That' s why MPDV's Manufacturing Integration Platform convinced us straight away and we were able to start the implementation without any delays. Thanks to the open platform architecture and the competent and uncomplicated support from MPDV, it was even possible for us to integrate a variety of existing systems on the MIP within a very short time during the first pilot implementation. MPDV's MIP Marketplace also provides us with a large ecosystem of interoperable solutions to further expand our platform."

Dr.-Ing. Sybille Haas,
Head of Smart Manufacturing & Industrial Engineering of the SCHOTT AG

The international technology group SCHOTT AG, headquartered in Germany, was looking for a universal platform for its 42 production sites around the world to transfer manufacturing processes from heterogeneous IT and OT into a uniform and comparable data basis. The platform would then be used to implement digitalization use cases such as the "Digital Manufacturing Order", "Operator Guidance", and also "Machine Learning Based Process Optimization".

SCHOTT has invited tenders for a worldwide proof of concept to find the right platform. MPDV succeeded in asserting itself against several well-known competitors with its Manufacturing Integration Platform (MIP) and has won over SCHOTT to provide the manufacturing platform for the future.

The initial start was a pilot implementation of MES HYDRA in one business area and the connection of three existing systems. These are the in-house developed process data collection system, a Data Integration Layer (DIL) from an external provider and an Enterprise Application Integration Layer (EAIL), which is used to connect the corporate management level of the SCHOTT AG. The MIP has also been incorporated into the Manufacturing Integration Platform SCHOTT (MIPS) to access further applications from third-party providers, which also include an MES system as well as a CAQ system.

About SCHOTT AG

Pioneering — responsibly — together. These attributes characterize SCHOTT as a manufacturer of high-tech materials for specialty glass. Founder Otto Schott is considered its inventor and became the pioneer of an entire industry. Always opening up new markets and applications with a pioneering spirit and passion — this is what has driven the #glasslovers at SCHOTT for more than 130 years. Represented in 34 countries, the company is a highly skilled partner for high-tech industries. With the best teams, supported by the best digital tools, the group intends to continue to grow.

Powerful product portfolio for many industries

ALL-IN

Download, install, get started — no smartphone without an app. The idea of appification is also catching on in manufacturing IT. Appification can work here on an interoperable platform where manufacturing apps are docked. The aim is to develop customer-specific solutions that are easy to implement. MPDV and FELTEN are at the forefront.

FELTEN and MPDV, two strong brands, joined forces two years ago. FELTEN as a proven expert for digitalization in process manufacturing and MPDV as a long-standing expert for discrete manufacturing and Smart Factory. Together, the two companies can look back on almost 75 years of experience, two of which they have been cooperating in the MPDV Group.

Both companies have geared their product strategy towards advancing the platform concept and developing useful manufacturing apps (mApps), which can then be offered to different industries. "The two companies together have a powerful product portfolio providing the perfect solution for both discrete and process manufacturing," says Marco Pfeiffer who has been responsible for the operational business of the FELTEN Group since 2011. By exploiting synergies, the companies' applications complement each other perfectly: "Everything fits seamlessly, the FELTEN mApps and the mApps of MPDV," Pfeiffer continues.

ABOUT THE PERSON

Marco Pfeiffer started as a project manager at the FELTEN Group in 2007 and has been shaping the operational business from the location in Luxembourg since 2011. He was appointed Director Products & Solutions in July 2021.

"Our products can be perfectly combined with other applications — for even more functionality!"

Marco Pfeiffer,
Director Products & Solutions

MIP as the centerpiece

MPDV's Manufacturing Integration Platform (MIP) is the core element integrating different applications into the existing manufacturing IT and combining them with each other following a plug-and-work principle. Thanks to the open platform architecture, existing systems can still be operated. Users can also combine mApps from different providers as they like. An ecosystem of mApps is available generating great benefits for manufacturing companies, developers, system integrators and machine manufacturers. The vendor lock-in effect, which often complicates provider or system changes, is bypassed. The result is maximum flexibility and a wide range of functions for the customer.

Central data storage

All data is saved in the database of the MIP integration platform and centrally kept there. According to Pfeiffer, the advantages are obvious: "Since the data is interoperable and centrally available, no further interfaces are required. The data stored can be used for analyses and other apps."

A tangible example from the food industry illustrates how simple it can be to implement individual requirements during digitalization: "The customer has installed the complete PILOT:MES. They still require a planning tool and a time and attendance application. Both can be seamlessly integrated using mApps from MPDV," Pfeiffer points out. They do not need to worry about interfaces or compatibility and can use the same supplier.

Although the solutions are off-the-shelf and can be installed conveniently, the result is highly flexible and personalized. Thanks to the MIP, also customers can be supported who require a stand-alone solution.

Digital checklist

The example of the digital checklists shows how well FELTEN and MPDV applications interact. The application manages any number of checklists that are displayed to an operator at defined times. The product of the FELTEN portfolio is also available as mApp for the MIP. Thanks to interoperability, the event triggering a specific checklist can be provided by any application. When the checklist is completed, the information can be used by other apps evaluating and visualizing the data.

True to FELTEN's simplicity approach, the overarching goal is to make digitalization as easy as possible.

THE FUTURE OF SMART FACTORIES

COMPETENCE BOOK FOR DECISION-MAKERS. ON SALE FROM SPRING 2022.

Find out why the Manufacturing Integration Platform (MIP) is setting and not just following the trend.

mpdv.info/publications

APS FEDRA 2

PRODUCTION PLANNING: EASIER THAN EVER

In this interview, Martin Bißdorf, Executive Manager PD-Product Management at MPDV, explains how the new version of the planning solution APS FEDRA supports companies of all industries and sizes.

Mr. Bißdorf, the Advanced Planning and Scheduling System (APS) FEDRA was introduced to the market in May 2020. Could you tell us about MPDV's experience since then?

Martin Bißdorf: I get the feeling that we are much better perceived on the market. We are not only the classic MES provider, but also offer the right solution for other challenges — like our APS FEDRA. We are increasingly approached by interested parties looking only for a planning solution. That wasn't the case previously. Of course, our Manufacturing Execution System HYDRA has also become more comprehensive as a result. FEDRA and HYDRA work extremely well together. If a company is already using the MES of another supplier and is only looking for planning software, we can now act much more nimbly with APS FEDRA. We continue to meet the requirements of VDI 5600 and go far beyond them, especially in planning. For example, an APS can do more than the detailed planning in the MES — especially if you put our APS FEDRA upstream of the ERP and use it to plan throughout the sites.

Some customers have already had excellent experiences with artificial intelligence-based planning, such as VACOM. However, other manufacturing companies are also thrilled with APS FEDRA.

FEDRA 2 is now released after a little more than a year. What are the innovations that users can look forward to?

Martin Bißdorf: In addition to the numerous technical improvements, I would like to single out multi-site planning, which allows customers to plan over the course of several systems and locations. For example, one system is installed in Germany, one in Poland and another somewhere in Asia. Initially, the individual systems run autonomously, but if the customer wants to combine the systems, they can do so with APS FEDRA 2. This means that the planning solution's point of use is even

FEDRA 2 HIGHLIGHTS

- **Multi-site planning:** Planning of several plants / locations, also across several time zones.
- **Live scheduling:** Enables parallel work with online updating, even over multiple plants.
- **Integrating material availability:** Automatic planning can factor in material relationships and indirect order relationships via material dependencies as well as WiP material.
- **Multi-resource planning:** Simultaneous planning of secondary resources, material and especially personnel.
- **Real-time ATP:** Available to Promise; FEDRA determines on request possible completion date against real capacities taking into account the order situation and all boundary conditions.
- **State-of-the-art architecture:** Support of variable system infrastructures and operating models by centralized planning logic and separation of visualization and manual planning.
- **Optimized data management** and algorithms enable scalable and high-performance processing of large data volumes and extensive dependencies.

shifted upstream of the ERP systems. But we still focus on the detailed planning. FEDRA schedules operations on machines accurately to the second if required — but now also covering different plants.

To make this work, we store all times in UTC and convert them to the desired time zone when they are displayed. Something that has already proven to be successful in aviation and also works in the manufacturing environment.

The planning itself has also become more flexible: For example, several planners can now work on a scenario simultaneously as part of a live planning process. Every change is immediately visible to all participants, just like in an online document — this works in one plant as well as it does for several sites. This also simplifies the distribution of work. Naturally, the conventional way of working with planning data still functions.

And how do you ensure that you don't get in each other's way?

Martin Bißdorf: Quite simply, the moment a planner picks up an operation to move it, it is locked for all others until they release it. Obviously, it makes sense to set up planning rules, but the system guarantees that an operation can only be postponed by one planner at any given time.

That being said, my favorite application is the combined personnel scheduling. We can now also see the personnel requirements directly in the order planning and immediately schedule the employees accordingly.

This is where I would like to jump in: what exactly does it mean when employees are scheduled in the same application as orders and operations? What are the benefits??

Martin Bißdorf: Initially, it increases transparency. I can see and also plan simultaneously employees including their particular qualifications, and deploy them on specific workplaces. In doing so, I am so flexible that I can schedule an employee down to the second and realize a job rotation. Employee A starts at 9am on machine 1, moves to machine 3 at 10am and moves to machine 5 at 11am. Between 12pm and 2pm the employee is responsible for machines 6, 7 and 8. Hence, we can also schedule multi-machine operation. This is a huge boost in flexibility compared to previous solutions. In FEDRA we incorporated feedback from our customers, who sent us various ideas and requests during the implementation process.

In combination with the option of live scheduling, it is possible to envisage one person scheduling the operations and another assigning the personnel in parallel.

Is FEDRA still a solution for all manufacturing companies

Martin Bißdorf: Yes, definitely! Everything is possible, from a simple planning of a few operations to the planning of complex scenarios with multi-dimensional resources. AI support also makes automatic planning much better. APS FEDRA is fully interoperable with other applications via the MIP — be it our HYDRA X, solutions for the process industry from FELTEN or other mApps. FEDRA accesses the order backlog in the MIP and adds to the planned dates. FEDRA doesn't care which MES fetches the orders and operations for execution. APS FEDRA can also be operated as a stand-alone solution. For this purpose, there are functions in FEDRA to record quantity data from the shop floor.

That will certainly go down well in the market. What happens next with FEDRA?

Martin Bißdorf: We are working on getting more customers on board with AI-based planning. At the same time, we are thinking about new functions to solve specific planning problems. The next developing step concerns processing centers. Here, several operations will run simultaneously or alternately. We want to have a standard solution in the foreseeable future. Another idea is the planning of assembly areas. It is all about planning the layout and use of space over time. We definitely envisage a market for this.

Thank you for the interview.

THREE QUESTIONS TO DR. WINFRIED FELSER

Since 2000, Dr. Winfried Felser has run the Competence Site, a network of several thousand experts from science and business who deal with digital transformation in management, IT and technology. He is editor of the Competence Report and Books as well as author of LinkedIn Pulse, The European, Absatzwirtschaft and other trade media.

People or machines?
People and machines! I believe in a new kind of humane imperative as part of the Smart Factory. We should not experience a new competition of intelligences, but rather a superior collaboration of people and machines that perfectly combines the strengths of both.

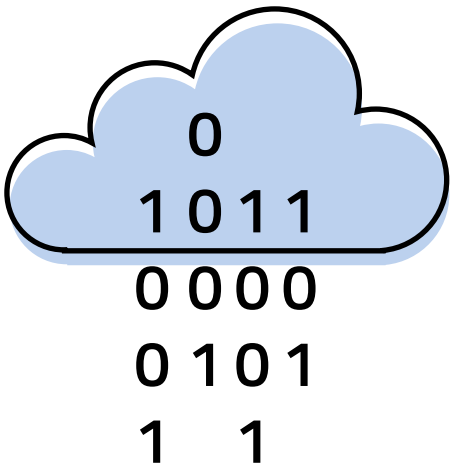
Always-on or digital detox at times?
On a good Saturday, I manage to do without digital devices! But, to be honest, I'm currently still too much driven by the machine. In fact, the people behind the machines. "Social" media can have adverse effects on social contacts ;-).

Favorite pastime outside the digital world?
Writing books on how we can succeed in the new "humane imperative".

Trends in Manufacturing IT

WHAT WILL 2022 BRING?

Technology is frequently the primary focus when analyzing trends for the future. That is definitely too short-sighted. In fact, a holistic approach is called for that also takes organizational, social, economic and ecological aspects into account. According to the experts at MPDV, the following three issues are expected to set trends in manufacturing IT in 2022.



1. Cloud, edge and SaaS

Well, cloud computing is first of all a technology. But that's not all — cloud computing will not be possible without edge computing in a Smart Factory environment. Why? Cloud fulfills many requirements in terms of scalability, availability and standardization. However, some processes in manufacturing need real-time capability as well as the security that production can continue even if the network connection to the cloud is interrupted. Data from the cloud can be made available for the shop floor (e.g., the next order), while actual data (e.g., machine status, quantities, process data) can be stored temporarily. Steps must be taken to ensure that no data is lost and only approved components are introduced into the process.

An instance close to the machine or process is needed for the actual implementation. Edge computing plays to its strengths here. Local components buffer data — from the cloud and also from the shop floor. In the event of a network failure, production can continue and at the same time all relevant data is consistently recorded.

Let's look at the solution Software as a Service (SaaS). Here, software is not operated by the user, but by a service provider or the software producer. The user pays a regular fee and hands over responsibility for operating, maintaining and updating the IT environment on the server to a provider. The user is responsible for the edge where they operate the devices to display the software in the office and the shop floor. The edge also controls local data collection processes. Users typically don't realize whether the system is operated in the cloud or locally in a data center. However, the difference couldn't be greater for the in-house IT department.

Besides the technical opportunities, the trust of users is also vital. The ERP environment is more advanced in this respect and businesses are increasingly opting for a SaaS solution. The share of SaaS is also expected to increase successively in manufacturing IT, since the bandwidth on the Internet is becoming bigger and affordable, and confidence in the cloud is also growing.

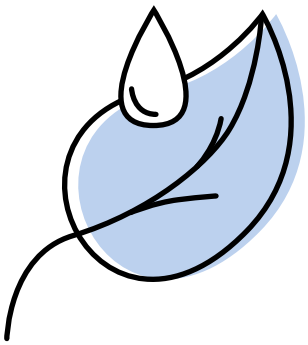
2. Knowledge management & self-regulation

"Knowledge is power" is a saying that is also gaining in importance in the Smart Factory. Only if you know what is exactly happening in your factory, you can take countermeasures at an early stage.

Nowadays, knowledge management is only found in the minds of the skilled workforce. They know that some events have a kind of domino effect and a particular noise in the shop floor can indicate a specific machine malfunction. Being able to define such associations in structured findings and store them on a system is the first step leading to a knowledge management system.

In the second step, all data is made available to an artificial intelligence (AI) so that it can perform a continuous pattern recognition or anomaly detection. If an anomaly occurs or the AI detects a pattern that deviates from the norm, it searches the data management for documentation of the symptom and suggests a countermeasure to the operator. If the pattern is not yet documented, it is stored in a new entry. The success of the measures introduced is also recorded.

Taking such a scenario a step further, the AI system itself can evaluate and initiate the actions stored in the knowledge management system. The result is an autonomous system capable of acting by itself. Needless to say, this calls for precise specifications and a considerable degree of trust. However, both can be gradually expanded over time and supported by release queries. Likewise, technology is not enough when it comes to knowledge management. Setting and adhering to rules is a basic requirement. In order for employees to gain confidence in AI, a structured change management is conducive to achieving the goal.



3. Sustainability

Sustainability is one of the three fields of action in the 2030 mission statement of the Industry 4.0 platform and has long been embraced by the manufacturing industry. But this trend also has several aspects that are not exclusively linked to the environment in an ecological context. Instead, sustainability can also be viewed in terms of economics and society. Economically, it's obvious that saving energy and resources protects the environment and saves money. Today's manufacturing IT can make a major contribution to resource efficiency.

To understand the social aspect of sustainability, it's worth digging a little deeper, as frequently cited topics such as the skills shortage or demographic change play also a significant role. But what has this got to do with manufacturing IT? That's quite simple: by providing the appropriate functions, manufacturing IT can ensure that even unskilled workers can produce even complex products — for example, with a step-by-step operator guidance in assembly. User interfaces can be adapted so that older people can also work with them. In place of a skilled workforce, people available can then do jobs at hand. Increasingly, manufacturing IT is taking responsibility for the working environment and ensuring social sustainability.

To return to the ecological and economic aspects: Sustainability means using only those resources that are absolutely necessary. Consequently, finished products must be flawless. Scrap is superfluous and wastes resources. The first step in reducing scrap is to understand why it occurs. Manufacturing IT helps by recording and documenting every deviation from the target. This includes manufacturing defects, but also increased energy consumption. An increased power consumption could indicate worn tools on the one hand, and a leak in the energy supply — e.g. compressed air or steam — on the other.

And finally, there is another issue related to sustainability: paper consumption in manufacturing. One of the biggest paper gobblers is production. If a production order is printed out, ten or more pages are quite the norm and if changes occur, old copies are collected, and replaced by new ones. The paper mountain keeps rising and rising and rising.... — small batch sizes and product diversity amplify this effect. A digital shop floor management can at least reduce the paper consumption to a minimum by using industrial touchscreen PCs in the factory floor and ideally in the vicinity of relevant workplaces. Besides reducing paper consumption, it also cuts down on the work required to distribute information in the shop floor.

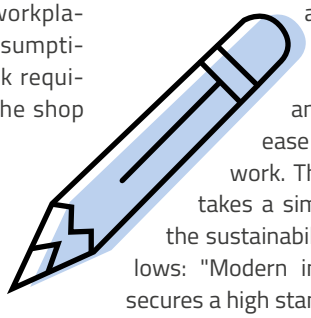
Conclusion

Benefits from synergies

Because the Smart Factory is highly networked, the abovementioned trends seem to merge and show some synergies. As a result, the benefits of knowledge management ensure greater resource efficiency and thus drive sustainability. At the same time, knowledge management needs a suitable platform to store data — this is where a cloud solution is typically used. However, cloud computing can also be sustainable, because outsourcing manufacturing IT to a service provider allows energy consumption to be more accurately controlled. On top of that, people might think more carefully about what data is really needed and for how long. Fixed costs of the in-house data center are now turning into real costs for a service provider. Similar to the reduction of overhead costs in favor of order-specific costs, it is worthwhile to allocate operating costs to specific IT systems.

2022 widens the scope

Even if the above observations border on a philosophical treatise in places, at least one thing is clear: deploying innovative technologies will no longer be sufficient in the future. It is much more important to venture beyond the horizon in order to understand the bigger picture. The time of data silos is over. We need to look at the whole package and, above all, include the people. Because no matter how intelligent manufacturing IT becomes, people will always have the upper hand and play a central role. It is also so important that people feel at ease and stay motivated at work. The Industry 4.0 platform takes a similar view and describes the sustainability field of action as follows: "Modern industrial value creation secures a high standard of living."



More on the Industry 4.0 mission statement 2030:

mpdv.info/mission-statement2030

People's Role

PEOPLE ARE PULLING STRINGS

The role of humans in the Smart Factory is being discussed endlessly and especially the question about what tasks people will assume in the future. However, considerations should start at an earlier stage — right at the very outset of the journey. Let's face it, many companies are still miles away from a self-regulating factory where robots run the show. What should we bear in mind right now?

Inform people

People don't like change and even fear it. They fear losing control or losing their job. You can only combat fear with knowledge. That's why it is so important to involve employees in change processes at an early stage and to communicate progress in (digitalization) projects continuously. If the project managers take the matter for granted and it's not communicated properly, it is possible that the change will completely bypass colleagues. And they feel left out.

FACT 1

"It's not just the material that has to flow in the factory, but also information," is how Jürgen Rieger, a member of the management team at Perfect Production GmbH, sums it up. There must be enough time to accompany the change process by way of communication. What are we going to do? Why are we doing it? How are we doing it? What happens if we don't go ahead? Such questions need to be answered for all stakeholders who are directly involved in the project or the ones directly affected by new processes and for those whose activities will change in the future.

Involve people

The factory of the future must first be designed before people can assume their intended role. "The technology will have to change and the organization itself will have to change in order to become really lean," Jürgen Rieger concludes, adding: "But it's not just a matter of ramping up the technology or reorganizing something. It's all about getting people involved and not just presenting them with a fait accompli.

FACT 2

For this reason, it has always been very important to Perfect Production to convince people of the necessary changes and to involve them closely in the projects. A holistic approach makes it clear to employees that everything is being put to the test and that the full potential is being tapped. This creates significantly more acceptance for the entire change process and the fear of change turns out to be harmless.

Train people

Those who start digitalizing their production now still have enough time to familiarize their employees with new requirements and to train them accordingly. "As a company, we have to achieve that employees are happy to participate in the change process and play an active part in improving and advancing the processes," says Jürgen Rieger.

FACT 3

Furthermore, one of the goals must be to create an adequate knowledge base to enable people to deal effectively and safely with automation and artificial intelligence (AI) in the future. They should be able to use and trust the new technologies and innovations — but not blindly. People's cognitive abilities will continue to be relevant in the future when it comes to questioning things and identifying potential for optimization. In the factory of the future, people will still be the ones who pull the strings in the end.

This is how production planning works at VACOM with AI Planning

AI — KINDLY TAKE OVER!

Capacities, qualifications, setup times and much more: every production planner knows from first-hand experience that there is a multitude of variables that must be accounted for when planning orders. Hours tick by before the planning is finalized. And in spite of all the diligence, the result is usually far from perfect. The use of artificial intelligence (AI) reveals the potential hidden in production planning — not only in theory, but also in practice.

VACOM Vakuum Komponenten & Messtechnik GmbH has been using AI Planning from MPDV in production since March 2021. The company was founded in Jena in 1992 and makes vacuum chambers as well as custom components for applications in the high-vacuum sector based on customer specifications. Michael Wetzel-Staar, Production Manager at VACOM, points out that they predominantly produce custom and one-off parts, which makes the use of AI Planning so important. After all, AI helps to avoid time-consuming scheduling at the workstations, improve on-time delivery and reduce lead times.

No part is like the other

Unlike companies that mass-produce large quantities of one and the same item, VACOM's products are hardly ever identical. There is no consistency like there is in injection molding: "We don't have 1,000 orders with the same workflow. We have 1,000 orders, all of which have a different process and where the logistical routes cross umpteen times. Some components go back and forth between the milling and the welding shop five to ten times," Michael Wetzel-Staar explains the complexity.

All the planning work that used to take us several hours a day is now done by artificial intelligence. "We use AI to schedule orders and operations at each workstation. Before that, scheduling and rescheduling was a strictly manual activity." As soon as just one order was late, it was back to square one. The new orders also had to be planned separately along with all the operations, which was a time-consuming process. Lately, the software handles all of that. During a planning run, the system schedules all new orders fully automatically and the entire process runs overnight.

This is because data is then at rest and AI Planning can set up the planning cleanly. "All the systems are synchronized with each other. We first need the automatic run from our ERP system to generate new orders. Planned orders are created based on this information, which are then implemented by the scheduling department. Once those are implemented, they're up for scheduling in FEDRA."


JÜRGEN

DIFFERENT WAYS TO PLAN PRODUCTION

Manual planning
The user schedules by drag and drop, with only simple conflict checks.

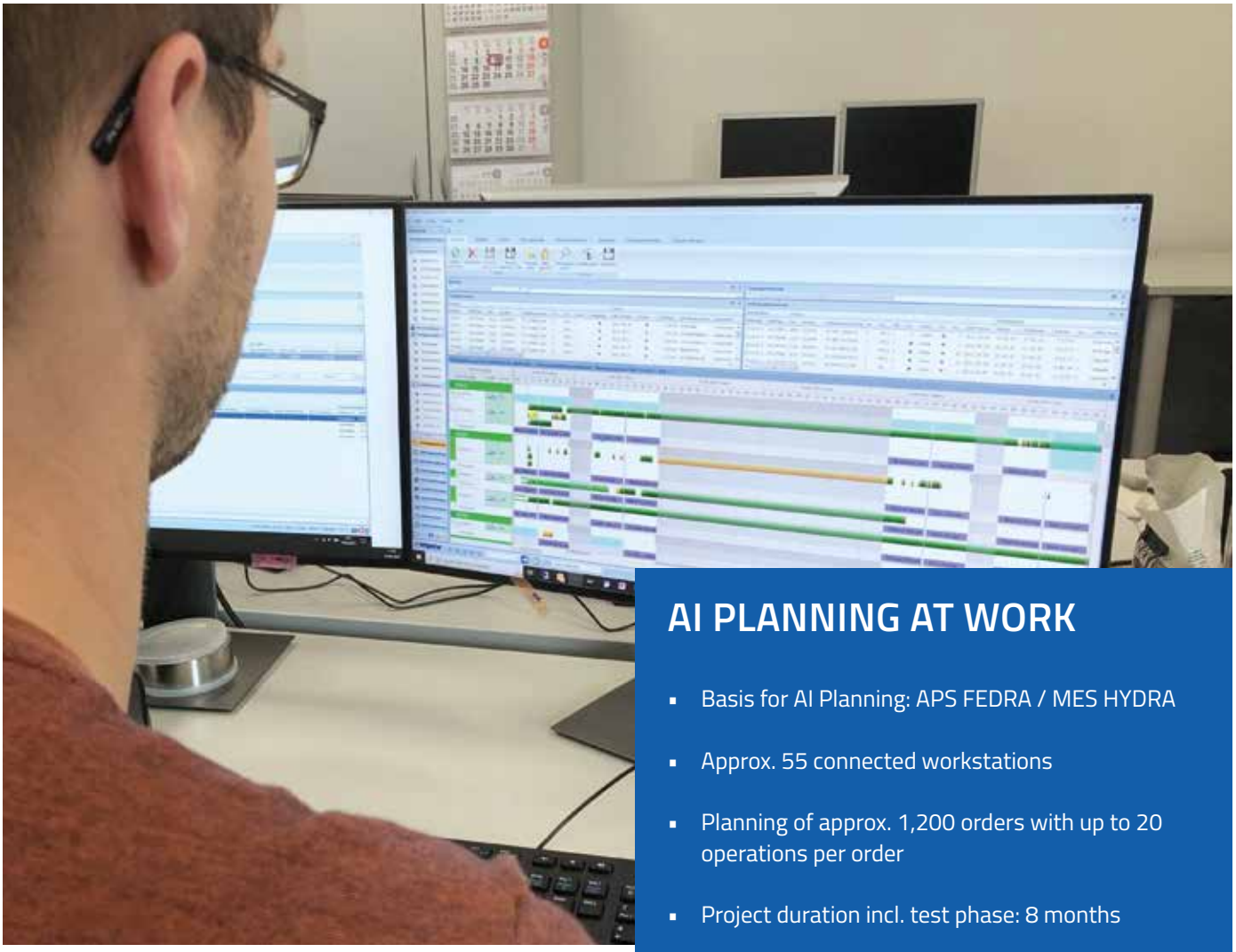
Automatic planning with heuristics
The user can configure all conditions by themselves. The planning then runs automatically step by step observing only the stored conditions.

Automatic planning with AI Planning
An algorithm factors all available data into the planning process to achieve an optimal result. Although the user can intervene in the planning at any time, they should avoid doing so, as they would only worsen the planning result.

Nothing else works

AI Planning factors in all orders night after night: "In single-part production, we cannot predict exactly by when an operation will be completed on a machine; that is variable. This is exactly where AI sets in." AI has the freedom to reassemble all operations so that the best possible planning result is achieved. AI Planning is able to schedule the next work step based on the available data showing exactly which parts have already been completed. Idle times are thus avoided.

To put it into numbers, this means around 1,200 orders in circulation, each with up to 20 operations, two to three orders per machine and per day and a planning horizon of six months. Personnel deployment data is stored for seven months to ensure AI is always supplied with sufficient data. "No one can keep track of that anymore. Therefore, we need a system that identifies what can be processed next and automatically schedules the following operations. When it comes to production volume and capacity, we can't move forward without the system: There is no other way."



AI PLANNING AT WORK

- Basis for AI Planning: APS FEDRA / MES HYDRA
- Approx. 55 connected workstations
- Planning of approx. 1,200 orders with up to 20 operations per order
- Project duration incl. test phase: 8 months
- Benefits: 50% time savings in planning, massive increase in adherence to schedules, significant reduction in lead times

Trust is good, but control is better

The finished planning is saved — but not finally accepted. Before production starts the next morning, the responsible employee looks at the escalation list and has the opportunity to intervene. While artificial intelligence plans resources optimally and reliably, and Michael Wetzel-Staar describes confidence in AI as relatively high, employees question whether orders might not be better planned, especially in the early days — but usually with little success.

However, in principle employees are positive about the software and have recognized the benefits: "We are very happy that we no longer have to plan ourselves, as that was a mindless drudgery." According to Michael Wetzel-Staar, the time saved on planning alone is around 50 percent: "Our fellow worker used to spend half their time on planning itself, now they have enough time to smooth things out in the ERP." This is necessary, because the ERP does not allow for another system to take over the complete production planning and specifies a start or end date, for example. This results in manual adjustments.

> "AI is only as good as the information it has at its disposal."

In turn, AI also demands careful attention and nurturing. After all, AI is only as good as the information it has at its disposal. Therefore, a complete personnel scheduling including leave and shift times as well as approximate values for the individual operations are among the basic requirements for an optimal planning result. "If there are deviations in the planned times and an order is completed faster or takes longer, it will lead to incorrect planning. No matter how good AI software is."

AI PLANNING

AI Planning is a planning solution from MPDV based on artificial intelligence.

About VACOM

VACOM Vakuum Komponenten & Messtechnik GmbH was founded in Jena, Germany, and is one of the leading European suppliers for vacuum technology and operates worldwide. The company is a specialist in vacuum mechanics, vacuum measurement technology and vacuum optics and manufactures vacuum chambers as well as special components for applications in the high vacuum range according to customer requirements.

"We are able to let the customer know when they will get their custom component upon order confirmation — and meet the deadline."

Improved on-time delivery, reduced lead times

While the time saved in planning is considerable, VACOM's real main goal is to significantly increase on-time delivery and compliance with deadlines. AI Planning allows to plan ahead thanks to the vast amount of data and its analysis. Consequently, predicting manufacturing events in the future is becoming more and more accurate. "We are able to let the customer know when they will get their custom component upon order confirmation — and meet the deadline. The deadline quality will increase massively," Michael Wetzel-Staar is convinced. Whereas the day-to-day planning of orders and operations is of particular importance, VACOM also keeps an eye on the next six months.

VACOM has another goal in sight, which is to significantly reduce lead times. Due to the order volume and complexity, it was previously challenging to keep track of all parts and their statuses. With the help of the new system, the time it takes for an order to reach production should be decreased and processes should become leaner. At the same time, this should also reduce work-in-progress and thus capital tied up in inventories.

What happened so far

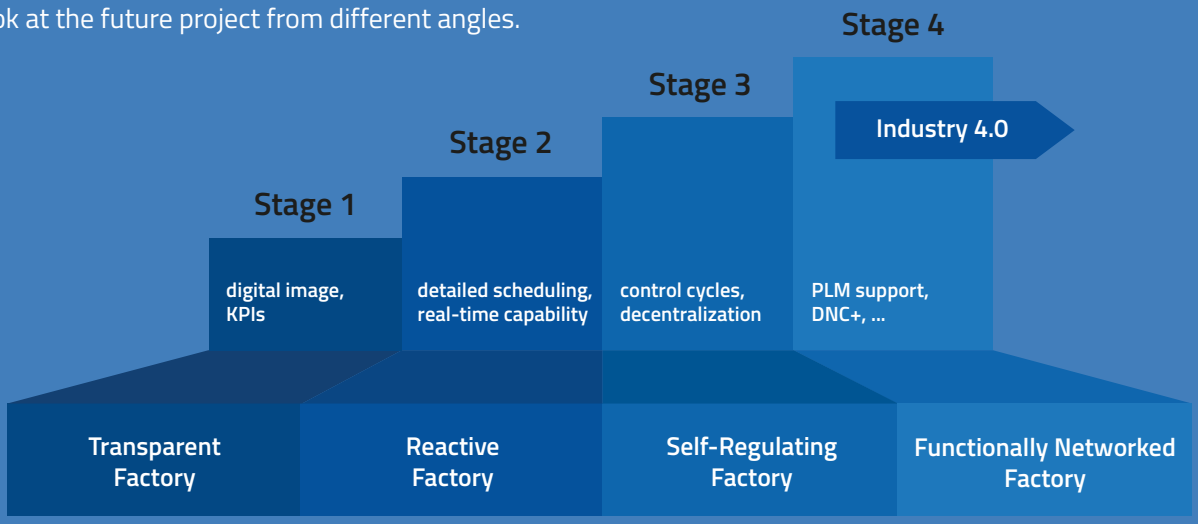
VACOM has been operating the Manufacturing Execution System HYDRA and the Advanced Planning and Scheduling System (APS) FEDRA from MPDV for several years. The different applications have been implemented step by step in several phases since 2015. What is remarkable here is the way it has been realized: while the ERP usually acts as the control system, at VACOM the ERP, Warehouse Management System (WMS) and Manufacturing Execution System are now on an equal footing.

The decision to add AI Planning to the existing planning application was made in 2020. The test phase started in summer and planning was implemented in the productive system in the fall. This was followed by a test period of several weeks in early 2021, during which AI Planning was put through its paces: All planning was saved as a simulation and closely examined. The go live then took place on a weekend in March: "It couldn't possibly have been done any faster," sums up Michael Wetzel-Staar. Since then, artificial intelligence carries out the complete planning.

Where do we stand and why?

INDUSTRY 4.0

Industry 4.0 — what is it all about and where do we stand? Let's look at the future project from different angles.



First inklings of the future

The term "Industry 4.0" was first used during the Hannover Messe 2011. This marked the start of the future project Industry 4.0 or the "Fourth Industrial Revolution". Over the following years, it was to become apparent that it wasn't a revolution but in fact an evolution.

MPDV responded to the new requirements as early as 2013 with its future concept MES 4.0 — well ahead of other software providers. MPDV specified with the concept a number of requirements from Industry 4.0 for manufacturing IT, which at the time primarily consisted of the Manufacturing Execution System (MES).

4-stage model and other theories

In 2016, MPDV succeeded in identifying a tangible way to Industry 4.0 with the 4-stage model "Smart Factory" that every manufacturing company could follow — no matter what size or industry. Typical applications were assigned to each of the four stages, gradually building on each other and leading the manufacturing company step by step to the Smart Factory.

In 2019, MPDV presented another model at the Hannover Messe: The Smart Factory Elements. The focus here is no longer on the way to the Smart Factory, but on the classification of functions and applications leading to a comprehensible structure. Here, the control loop was mentioned for the first time. In addition, many of the new buzzwords such as IIoT, analytics or prediction were assigned to a clear scope of tasks.

> Requirements have been increased. This means that new tasks had to be incorporated in the model.

Recently, the 4-stage model has been turned into a control loop. In one respect, things have become much simpler with the control loop but at the same time, requirements have been increased. This means that new tasks had to be incorporated in the model.

You can find out more on the subject in the new white paper "From the 4-Stage Model to the Control Loop of the Smart Factory".

mpdv.info/white-paper

From the theory to the working world

Many ideas of Industry 4.0 could already be realized with a Manufacturing Execution System (MES) like HYDRA. However, there was still a lot to be done, especially with regard to the required interoperability. MPDV laid the foundation for this with the Manufacturing Integration Platform (MIP). The open platform architecture and the semantic information model form the basis for an ecosystem of applications from different providers. With the Advanced Planning and Scheduling System (APS) FEDRA and HYDRA X, MPDV is also an application provider in this ecosystem, bringing the manufacturing IT market together with the platform economy. There are now more than 50 providers in the MIP Marketplace, enriching the ecosystem with a wide range of solutions and services.

History — presence — future

Looking back at the beginnings of Industry 4.0, most people remember prophecies such as "the product finds its own way through manufacturing". But it became quickly apparent that the digital transformation first had to create the necessary basis. After all, even today there is a lot of paper in production and thus many media disruptions. The first lesson learned was that more transparency and consistency are needed. As a first step, it is sufficient to simply replace paper and pencil with a tablet and an app.

Today, we are well on our way — in any case, the range of solutions for the Smart Factory is extensive. However, Industry 4.0 is not just about technology — it is also about organizational issues and, most importantly, the role of people. Only people are capable of resolving potential conflicts of objectives and making strategic decisions as even Industry 4.0 is unlikely to take these human strengths away from us. We also recommend to support the digital transformation with a change project. Not only does a change project integrate the entire wealth of experience of all employees, it also increases acceptance of the upcoming changes right from the start.

Where Industry 4.0 will take us in the future can be surmised by looking at the 2030 mission statement of the Industry 4.0 platform: It's all about interoperability, sustainability and sovereignty. In other words, it all has to come together to create transparency and efficiency for long-term competitiveness. At the same time, we should be mindful of the environment and society, and not neglect the needs of the individual. The ultimate goal is to achieve exactly what everyone wants with a high degree of flexibility.

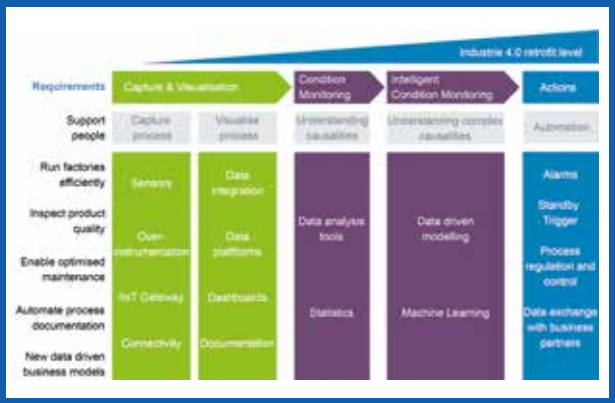
More on the Industry 4.0 mission statement 2030:

mpdv.info/mission-statement2030

> Only people are capable of resolving potential conflicts of objectives and making strategic decisions.

Industry 4.0 preliminary study

As early as 2007, MPDV conducted a kind of Industry 4.0 preliminary study called "Application Park" together with renowned industry partners for the Hannover Messe. While there was no name for it at the time, this integrated and highly networked manufacturing cell reflected many of the concepts that later appeared under the headings Industry 4.0 and Smart Factory.

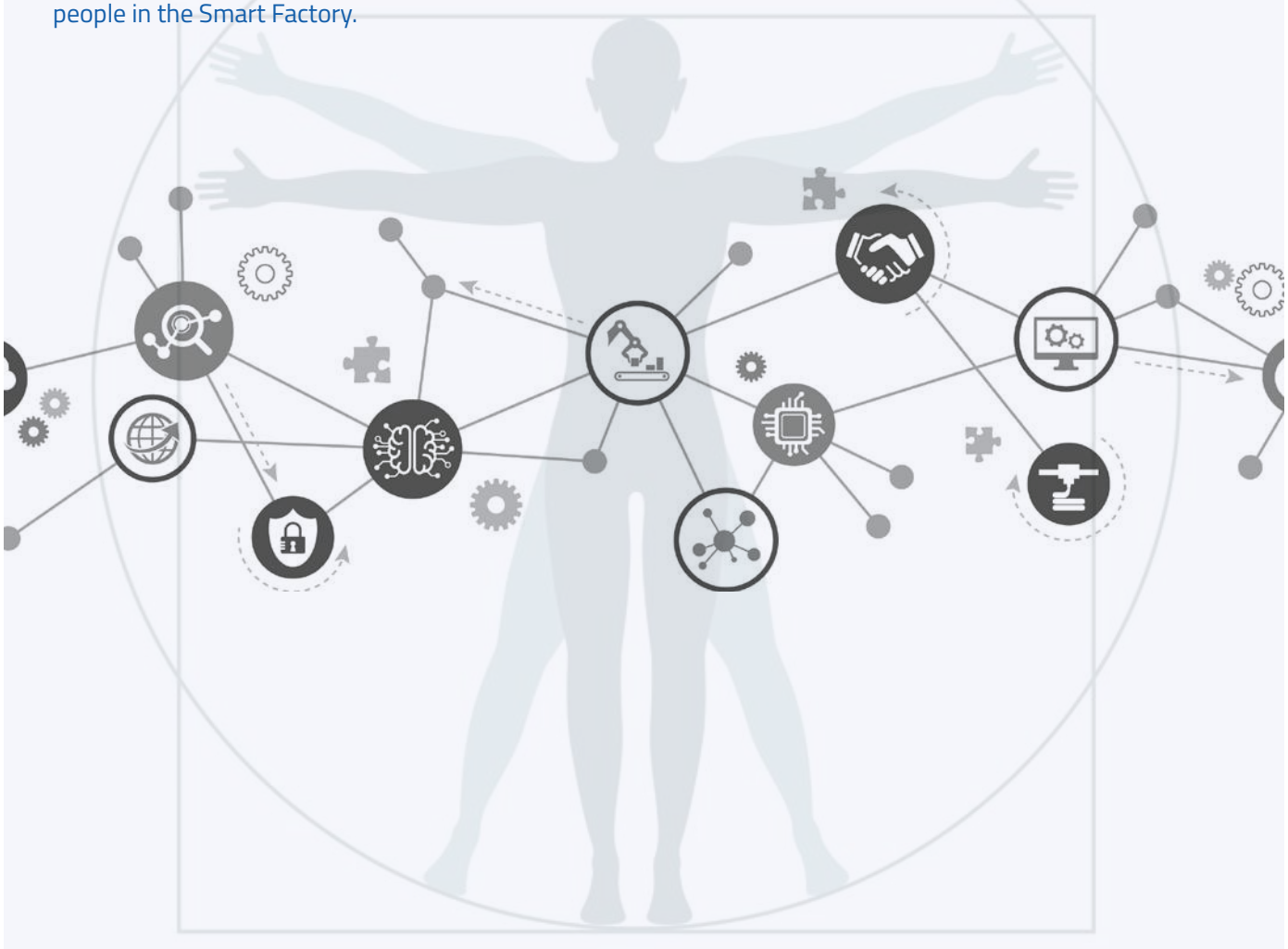


Source: VDMA

Column

PEOPLE IN THE SMART FACTORY: A DIFFICULT ISSUE!?

"Have people in the Smart Factory still got a role? Let's face it, that's how most discussions start." When a panel debate opens like this, you fear the worst. However, in the end, we are pleasantly surprised that the panel was able to convey the most important message successfully: Beyond the dystopia and utopia scenarios, real opportunities can be found for people in the Smart Factory.



The Smart Factory Week culminating in a panel

If, like the author, you are to accentuate the Smart Factory Week with a high-caliber panel on the role of people in the Smart Factory, then this is on the one hand an opportunity, but above all it represents a risk. Expectations for such a panel are high and at the same time, the topic seems to have been discussed thoroughly from a dystopian or utopian perspective.

In the worst case, such a conclusion to a rather technical week degenerates into an act of tokenism. If all goes well, you will be rewarded in the end for the risk you have taken. The feedback from a listener on LinkedIn encapsulates this perfectly:

'Have people in the Smart Factory still got a role? Be honest, this is how most discussions start when we talk about #digitalization in production in Germany. [...] Today I had the opportunity to attend an expert discussion with Dr. Winfried Felser, Jürgen Petzel, Prof. Christian Überall [...] and Dr. Markus Müllerschön. Here, for a change, the issue of people in the Smart Factory was viewed in a more favorable light. [...] Thanks for the great input.'

A timeless but contemporary issue

Before looking at the positive side, the importance of the issue and of people in Industry 4.0 (5.0) and in the Smart Factory were addressed. The fact that the matter is still far from being settled long after the dystopian study by Osborne and Frey and their announcement of mass job losses due to digitalization in 2013 or the counter-movements associated with Industry 4.0 was demonstrated, among other things, by the discussions surrounding Elon Musk and his "Lights Out Factory" in 2019 and beyond. automotiveIT stated almost gleefully:

'Not so long ago, Musk was fantasizing about a 'Lights Out Factory' where robots work around the clock and can do without lighting. Meanwhile, Musk remorsefully tweets things like: 'People are undervalued' [...] A blunder that meant production could not be ramped up as planned and cars ended up at the customer with glaring quality defects. Warm greetings from production hell.'

Dr. Winfried Felser

People will remain relevant today and in the future

Hendrik Härter announced at the end of August: "Industry 4.0: People have their rightful place in production". The subject seems timeless — and above all, so do the people involved in production. But let's not put on rose-colored glasses. You might highlight the positive impact but digitalization will indeed eliminate tasks for people. And this is not restricted to manual tasks, but also includes knowledge tasks thanks to AI and other technologies. That's a good thing. People remain important, but they are freed from tasks that machines can do better. It allows people to take on a new role and new tasks — according to the panel's own feedback.

New rolls and new tasks

I once wrote in a column: "On the basis of AI, the empowerment of humans through intelligent assistance systems and the like, as well as through intelligent artificial agents, will by no means lead to a new competition of intellects, but rather to a superior collaboration of humans and machines in a common collaborative-cognitive ecosystem that perfectly combines the strengths of both agents." People will take on new coordinative, creative and empathic tasks in this new collaboration. They become not only leaders, but also customer partners, coaches (instead of bosses) and problem solvers. And this is the case where the complexity of the tasks exceeds the capabilities of machines, at least today and probably for a long time to come.

That's how the listener of the panel debate summed it up on LinkedIn:

- *Human labor is supported, but not replaced by new technologies/systems.*
- *Automation is leading to a shift of competencies away from menial tasks to the intermediate ones.*
- *It's not the one technology that matters, it's knowing how to design the right system based on data and processes.*
- *Good qualification/training is the be-all and end-all for people to be able to deal with automation and AI (in all areas of the company).*

Extensive upskilling, reskilling and newskilling

I'd like to highlight the last point again. We won't succeed in a new humane Smart Factory world without extensive upskilling, reskilling and newskilling. Also, the focus must be people. For many a technocrat 4.0 or another Elon Musk will pipe dreams of a factory devoid of people. But if the focus and qualification prove successful, the issue is not a difficult one, but a great opportunity.

ABOUT THE PERSON

Since 2000, Dr. Winfried Felser has run the Competence Site, a network of several thousand experts from science and business who deal with digital transformation in management, IT and technology. He is editor of the Competence Report and Books as well as author of LinkedIn Pulse, The European, Absatzwirtschaft and other trade media.

2022

EVENTS & TRAINING COURSES

From consulting to implementation, from discrete production to process industry, the MPDV Group is first choice when it comes to digitalization. Throughout the year, we offer exciting events providing first-hand knowledge on our products.

No matter if you are a newcomer interested in the basics of the Smart Factory, want to find out more about our products or simply would like to know how other companies have mastered their digital challenges: our targeted webinars and best practice days provide plenty of information about the relevant topics.

And for all of you who would like to refresh their knowledge or learn something new, we offer more than 50 training courses — just contact us!

Further details on events and registration:

mpdv.info/registration

MASTHEAD

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For reasons of better readability, the simultaneous use of the language forms male, female and diverse is waived. All personal designations apply equally to all genders.

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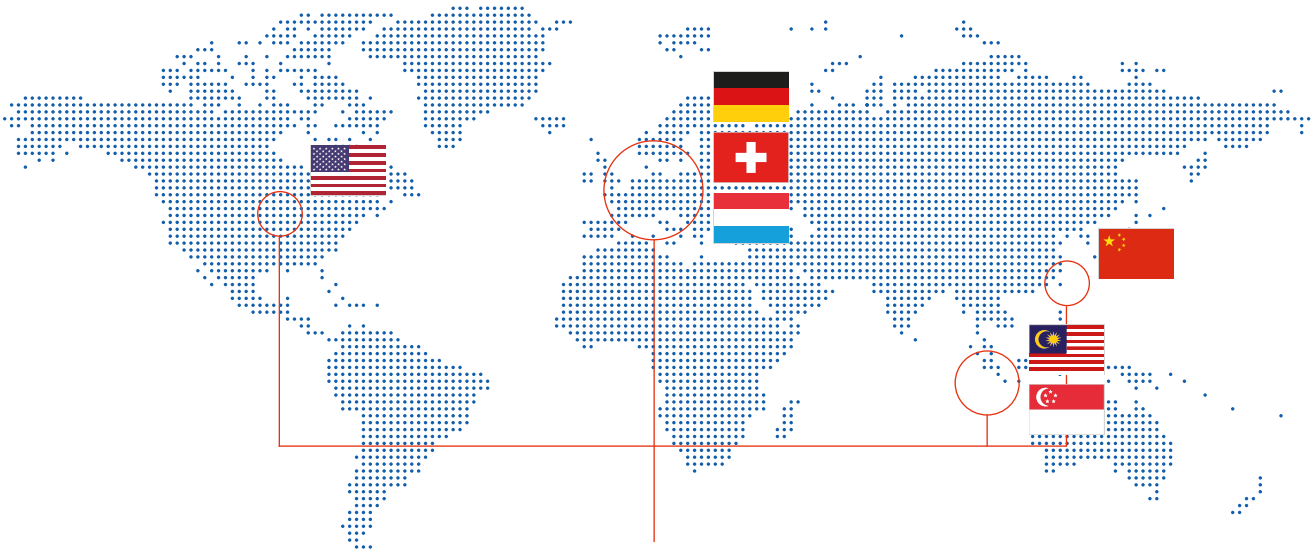

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