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PSI

EDITORIAL

Dear Reader,

In today's dynamic world, innovation and efficiency are crucial success factors. PSI rises to these challenges and makes a decisive contribution to process optimization with customized software solutions. In this edition, we highlight exciting innovations and projects that show how we can significantly increase our customers' efficiency.

In our cover story, Christian Welter, Pre Sales at the Logistics business unit, explains how the automated test tool of the warehouse management system PSIwms efficiently ensures the quality of warehouse processes. Thanks to easy configurability and the option of conducting standardized tests without programming knowledge, this tool offers a unique selling point on the market.

One further highlight: Trailer Dynamics, a manufacturer of innovative e-drive trains for semi-trailer towing vehicles, has implemented the PSIpenta ERP system faster and more cost-effectively than planned before the start of production. This lays the foundation for stable processes and long-term growth. We also present a promising approach to decision support in steel production. As part of a research project, PSI Metals has developed the multi-agent system HyMAS, which reacts flexibly to changes in the production process—a forward-looking solution for an industry in transition.

There is also news for our ERP customers: the new version PSIpenta/ERP 10 brings significant improvements and new functions. Product manager Flemming Hirschfeld provides insights into the release and explains why it is a major release.

This edition is rounded off by a best-practice report from the bilstein group, which has optimized its supply chain with PSIglobal. By using our software, the group has been able to significantly reduce its CO_2 emissions and increase the efficiency of its delivery processes.

I hope you find this issue of inspiring and informative.

Sascha Tepuric
PSI Software SE
Lead Business Unit Logistics

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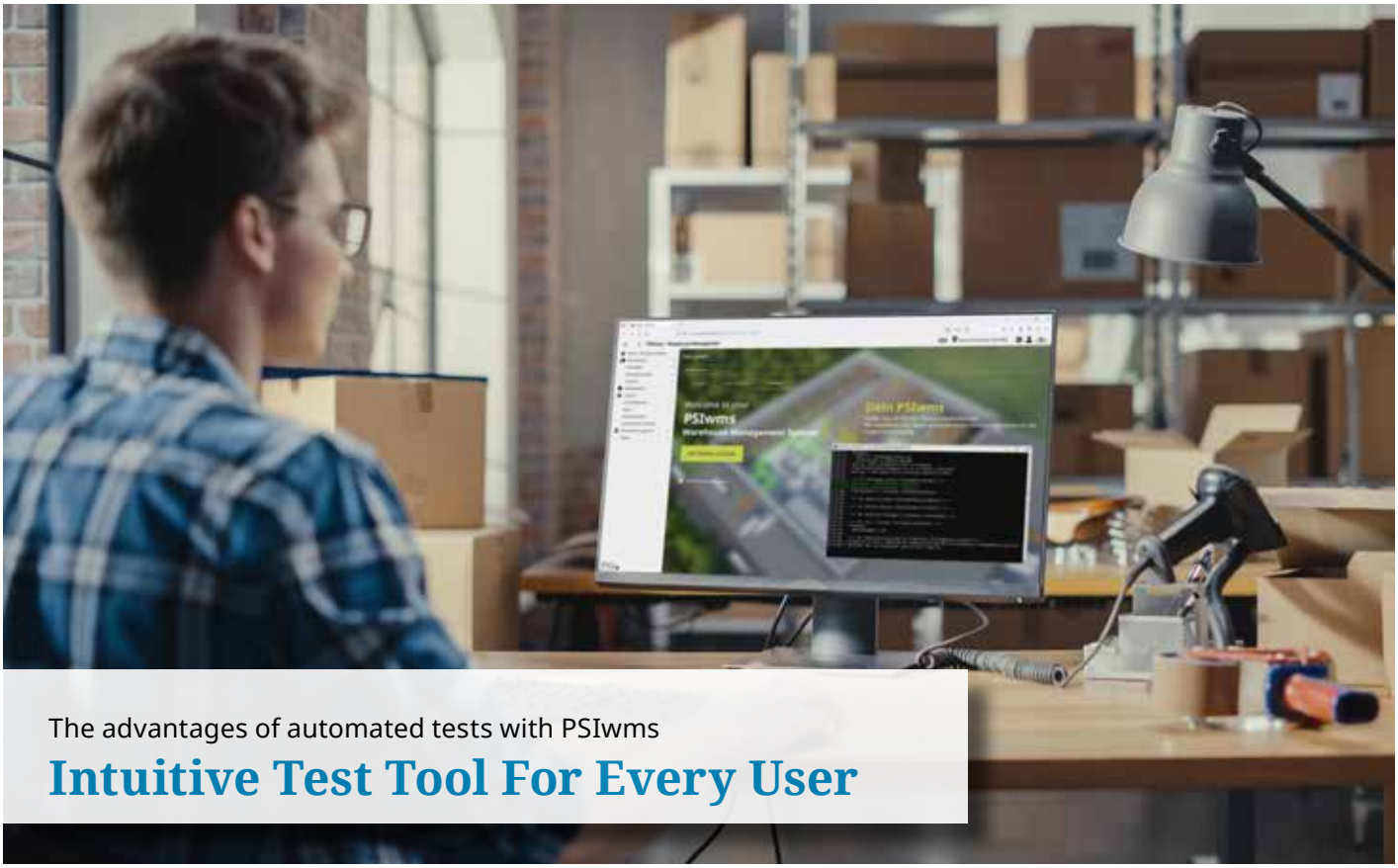


The advantages of automated tests with PSIwms

Intuitive Test Tool For Every User

Interviewed by Production manager, Christian Welter, Pre-Sales at the Business Unit Logistics, explains how the automated test tool in the PSIwms warehouse management system helps to efficiently ensure process quality in the warehouse. This test procedure is fully configurable and requires no programming knowledge. Every user of the system can use the tool to automatically test standardized functions and settings. With this, PSI offers a unique selling point on the market.

Mr. Welter, why are tests crucial in the WMS environment?

Regular software tests are a central tool of quality assurance—especially for the development or further development of a warehouse management system (WMS). Without professional test systems, there are no secure processes. Therefore, a warehouse system must be tested regularly to ensure that it works smoothly. Only in this way can it be ensured that all relevant processes run permanently and with consistent quality after changes in the WMS or in intralogistics.

Both providers and users are equally challenged in this regard. Users should be able to test the system when changes are made to the intralogistics or when they have been provided with a new release. To make this as easy as possible, we have developed a particularly user-friendly automated test tool for PSIwms that is perfectly suited for standardized functions and settings, especially for larger updates.

How does this system work?

During an automated test, configured, physical or software-based processes in PSIwms are checked for their functionality and accuracy. To do this, the program regularly and automatically simulates all predefined test cases based on a test database that represents the warehouse and uncovers any need for action. For example, in PSIwms, hundreds of virtual deliveries with different control parameters can be virtually received, transferred, picked and shipped within minutes, without manual intervention by the user and without affecting the physical warehouse.

> *Manual testing will be increasingly pushed back in the coming years, as the advantages of automated testing are obvious.*

First, cross-departmental test cases, also known as test suites, are defined in the program, which allows them to be applied in all logistical areas, whether in incoming or outgoing goods, picking or high-priority notifications. Special processes such as complex cross-docking variants are also controlled during the procedure, although they are used relatively infrequently. This screening ensures that all processes function as planned at all times.

What are the alternatives to automated testing?

It is also possible to check processes manually. Here, there are two variants: scripted and exploratory procedures. Scripted testing is based on a test suite, similar to the automated procedure. This clearly defines which actions the user must proactively execute in which order. The repetitive nature of the tests plays an important role in quality control. It is the only way to ensure that business processes documented in an earlier test case continue to function. The exploratory approach, on the other hand, does not define any fixed processes and therefore does not use a test suite. Nevertheless, it is advisable that users do not start involuntarily, but first define goals and create a plan to achieve them efficiently.

Is manual testing becoming obsolete?

Manual testing will not become obsolete altogether, as it is unavoidable when a system is customized. Not all test scenarios can be automated. The best example is the Graphical User Interface (GUI). If a customer has made special adjustments, manual testing is required to ensure that the GUI continues to respond as desired. Interaction with a surface cannot be tested or simulated automatically. Overall, however, manual testing will be increasingly pushed back in the coming years because the advantages of automated testing are obvious. Automatic tests avoid possible errors caused by manual input and reduce the workload. This allows human resources to be used more effectively and costs to be saved.

> *Our test procedure in PSIwms is fully configurable and requires no programming knowledge. That's a unique selling point.*

So the future belongs largely to automated testing?

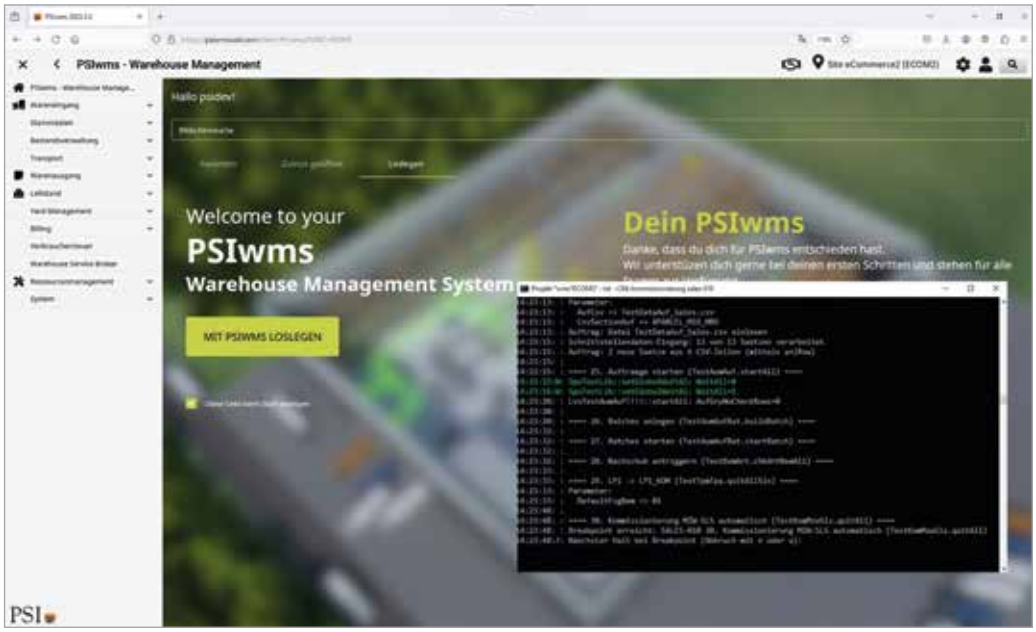
In the future, process tests will be automated more and more—yes. As the basis for agile software development, automated testing is increasingly coming into focus and is replacing manual testing as the dominant concept. This trend will continue in the future, which is why WMS users should look into this type of testing. Overall, the creation of test suites has already undergone a major change in recent years. In-depth programming knowledge is no longer as important as it used to be for operating them. That is why automated testing is becoming increasingly popular, as predefined applications can be simulated independently.

Meanwhile, manual test procedures, which require proactive interaction by the employee, are increasingly taking a back seat. It is therefore important that users have a particularly easy way to carry out tests themselves—especially with a system that can be configured as flexibly as PSIwms. Our motto is: as soon as a user configures processes independently, they should also be able to test them independently. This requires a particularly intuitive test system that is easy to use.

NOSTA location in Ladbergen.

How is this noticeable in practice?

For example, while tests usually have to be predefined, which involves a lot of work and planning, PSI's tests are structured in such a way that not every single process has to be meticulously defined. To test a complete cycle through the warehouse, it is often sufficient to define the object. Usually, this includes items and orders with their specific parameters. The test framework developed by PSI goes much further and formulates its test suites in the same language as the logistics configuration.



Automated testing in PSIwms.

When users learn how to configure processes, they also learn how to create test procedures and can do so without extensive programming experience. In other words,

> *Every employee who configures processes in PSIwms can write tests that check the function of these processes.*

every project member who configures processes can also write tests to ensure this function in the long term. Our test procedure is fully configurable and requires no programming knowledge. That is a unique selling point.

How is automated testing perceived by customers?

A good example is our customer the NOSTA Group, a family-run full-service logistics provider and long-standing partner of PSI. They have been using our automated test tool for several years with great success at several warehouse locations. Before implementing PSIwms, the NOSTA Group mainly tested manually, which took a lot of time. Moreover, there were errors and a lack of transparency in inventory documentation and processes.

The test tool integrated in PSIwms now helps the customer to ensure the functionality of all relevant processes in identical quality after changes to the warehouse or software. With the automated test tool, the NOSTA Group can test non-invasively even before it is included in the warehouse whether and how a new client influences the existing processes. Potential errors are detected early and precisely and, as a result, eliminated. This contributes significantly to the optimization of the processes. In addition, the company's overall cost efficiency has increased. That is why automated testing has become indispensable for the NOSTA Group.

View into the NOSTA warehouse.

Thank you for the detailed insight, Mr. Welter.

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User report: Trailer Dynamics relies on PSIpenta/ERP from the beginning

Early ERP Implementation Ensures Efficient Processes

Trailer Dynamics has implemented the PSIpenta/ERP system before the start of production—faster and more cost-effectively than planned. This has allowed the manufacturer of innovative e-trains for semi-trailer tractors to create the basis for stable business processes and long-term growth.

Although series production has not yet started, Trailer Dynamics is already receiving many pre-orders for its e-trailers. The manufacturer-independent, electrified powertrains for semi-trailer trucks are designed to significantly reduce diesel and CO_2 emissions in heavy-duty freight transport. This technology promises not only major fuel savings but also a significant increase in the range of electric trucks—a real step forward for the industry and a potential game-changer in terms of climate protection in road transport.

ERP system is the key to success

"A functioning ERP system is indispensable when it comes to establishing structured and efficient processes in a growing company," explains Sascha Stehmann, IT manager at Trailer Dynamics. For this reason, the company chose the PSIpenta/ERP solution, which was developed for the special requirements of discrete manufacturing. This means that companies in the mechanical engineering and automotive industries can cover almost all typical business processes in the system standard.

The company also placed a high value on scalability, not least in an international context, as well as the option of combining customer-specific and made-to-order production. This allows Trailer Dynamics, for example, to produce certain assemblies before the actual start of series production.

Early implementation pays off

Even before the start of production, Trailer Dynamics implemented PSI's ERP system, initially defining key processes such as material procurement, goods receiving

The first positive effects of PSIpenta/ERP were shown at Trailer Dynamics shortly after the go-live.

Thanks to PSIpenta/ERP, Trailer Dynamics is well equipped for further growth.

and accounting with the help of best-practice processes.

This forward-looking approach enabled a smooth implementation. According to Stehmann, the early project start not only offers the opportunity to properly implement processes and data, but also to train the user team in advance.

Successful project implementation in record time

How smoothly the implementation of PSIpenta/ERP succeeded is also shown in the project balance: 32 days were needed instead of the planned 62 days. This also means that the ERP project is well within budget. Stehmann attributes the success to an ideal starting position, comprehensive internal ERP knowledge and close cooperation with experienced consultants. Last but not least, he and some colleagues have had positive experiences with the system at previous employers, which they can now also draw on at Trailer Dynamics.

Cross-departmental data transparency

The system's initial effects were shown shortly after the go-live—above all, cross-departmental data transparency and efficient reporting. What goods have been received? What has been paid for and what has not? Which processes are over or under budget? All this information can be determined at the push of a button and requires neither time-consuming checking of lists nor clarifying phone calls.

A future-proof system

Trailer Dynamics not only chose the right moment for the implementation of the ERP system. The industry-specific solution also allows the company to grow step by step, relying on proven standards from the outset.

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Hybrid Multi-Agent System for Autonomous Production

Planning production processes in steel plants are complex tasks due to challenging market and production conditions. To assist users in this process, PSI has come up with an innovative decision-support approach as part of a research project. The core of this approach is a multi-agent system (HyMAS), designed to autonomously, flexibly, and swiftly adapt to changes and disruptions in the production workflow.

The PSI project managers Ralf Lenz (middle) und Heiko Wolf (below) in exchange with the expert of industrial production management Professor Thomas Volling of the Technical University of Berlin (above) about the HyMAS project.

Steel production is not only exceptionally energy- and cost-intensive but also characterized by demanding production conditions, complex manufacturing processes, and volatile market dynamics. Typical steel plants produce several million tons of steel annually. At the same time, they have to meet stringent requirements for delivery times and product quality. The energy required to produce just one ton of steel exceeds that consumed by an average two-person household in a year. Financially, the scale is immense, with even a slight drop in productivity leading to revenue losses of several million euros per year. This is often due to unavoidable changes and disruptions in the production process. To complicate matters further, adapting production plans often fails to account for all necessary information, especially when countermeasures need to be manually planned and coordinated across different departments in time-critical situations. The HyMAS research project addresses this challenge by testing adaptive and flexible methods within an Industry 4.0 production management system.

HyMAS—a Multi-Agent Framework

At the core of the HyMAS approach is a hierarchically and modularly structured system of agents that breaks down the complex production planning processes of a steel plant into individual agents. When necessary, existing plans can be adjusted at the local level without requiring a complete re-planning. At the lowest level, resource agents (RA) handle the scheduling of individual lines or resources, process agents (PA) manage the planning of an entire process step, and process chain agents (PCA) oversee the planning of consecutive process steps, as shown in Figure 1. The agents autonomously and automatically carry out process planning and can negotiate the creation of production plans with each other.

The HyMAS system is built on the JIAC (Java-based Intelligent Agent Componentware) multi-agent framework developed at TU Berlin and is integrated with the MES of a steel producer through the PSI Service Platform and REST interfaces. For simulating a cyber-physical production environment, we use the PSI MVF (Metals Virtual Factory). When production-relevant events are reported by machine-level Level 2 systems and commercial Level 4 systems, HyMAS first assesses their impact and, if necessary, generates updated production plans. To facilitate this, HyMAS is connected to external software services via web interfaces. Using a digital twin, the system simulates the effects of these events on the quality of the production plan and minimizes them using specialized optimization solvers. A machine learning-based predictive analytics tool then forecasts material quality at specific process steps to adjust process parameters as needed, while process mining enables the analysis and monitoring of the HyMAS system through

its own user interface. This allows human experts to understand and either accept or reject the decisions made by HyMAS. Thus, HyMAS does not replace the human planner but rather provides support in the decision-making process.

Practical Application

In a real-world scenario with a cold rolling mill, three continuous annealing lines, and an intermediate storage facility, we configured the experimental HyMAS system to react to quality, process, and market-related events. For instance, a machine failure can trigger a rescheduling of material, while in case of defective material, the processing sequence can be adjusted. In cases of critical inventory levels, changes to process parameters can control the throughput of upstream and downstream lines. Urgent orders can be scheduled across multiple production stages, minimizing the risk of delays to previously scheduled orders. An initial study demonstrated that the HyMAS approach could achieve an 18% increase in efficiency and an 8% improvement in on-time delivery. Additionally, planning adjustments can now be implemented much more swiftly than before.

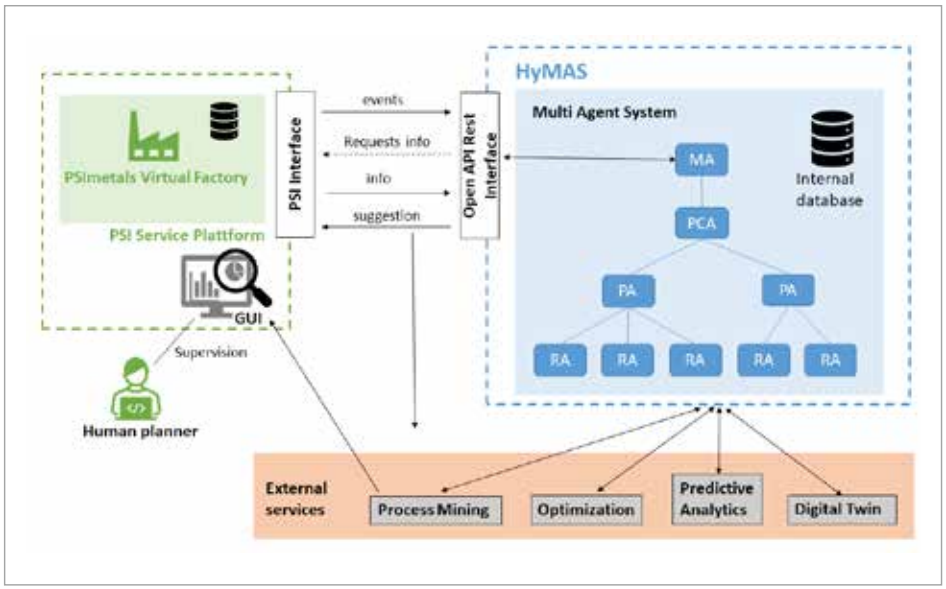

Figure 1: System Architecture of the HyMAS framework. Based on [1].

A collaborative transformation approach

The HyMAS project represents a significant step forward in steel production planning, helping to solve the complex challenges modern steelmaker face. By using a hybrid multi-agent system, HyMAS provides a dynamic and autonomous approach to managing production processes, enabling steel plants to adapt swiftly and effectively to disruptions and changes. The integration of advanced technologies such as digital twins, machine learning-based predictive analytics, and process mining enhances the system's capability to optimize production plans and improve operational efficiency. The benefits include improved efficiency and on-time delivery, rapid planning adjustments, and swift support in decision making, all of which significantly reduce the financial impact of disruptions. HyMAS represents a transformative tool for steel production, offering a sophisticated and collaborative solution that complements human expertise and enhances overall productivity in a challenging industry landscape.

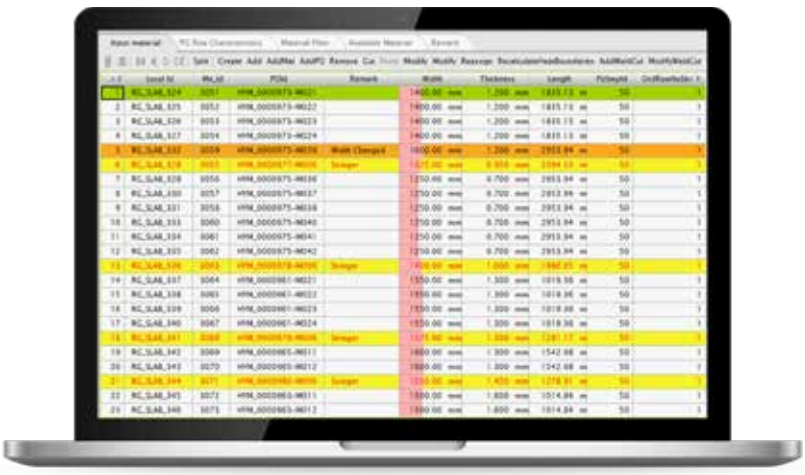

Figure 2: Schedule of a continuous annealing line in the PSI Office GUI within the HyMAS system.

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Adaptive—Predictive—Generative

Being adaptive is a core feature of AI-based decision and optimization algorithms. Unlike conventional optimizations, adaptive AI optimization algorithms not only react to data, but also adapt their own behavior to the current data, draw conclusions from it and are able to intelligently predict how to generate the optimization solutions being sought.

Adaptive AI optimizations are a central pillar of PSIqualicision AI. As sequencing and scheduling tools, they are used in the automotive industry, in metal production and in the energy industry at hundreds of decision points in customer business processes. The adaptivity is achieved by the self-learning, automated Qualitative Labeling of data, which creates a bridge between optimization methods and machine learning.

In contrast to classic AI systems, in which data labeling (connoting) is carried out once or a few times in advance and the labels subsequently retain their validity for a long time, the labeling of data with regard to their meaning (semantics) for industrial business processes must be carried out flexibly and automatically due to the continuous change of production parameters, which could be a daily changing order mix. However, in the field of industrial AI, labeling must also be done algorithmically for efficiency reasons—which is precisely one of the strengths of PSI's AI in the form of PSIqualicision AI.

Traceable visualization of the optimization AI

Figure 1 shows the GUI of a PSIqualicision sequencing system as used by automotive OEMs and operated by control room personnel. The system models, optimizes and visualizes production sequences in automotive factories, making sure that orders are distributed as desired over a selected period of time (week, day, shift or the next X minutes in real-time mode). The bar chart in Fig. 1 displays the order (right-hand drive, convertible, panoramic roof, hybrid engine, etc.) in rows and the orders placed in sequence in columns.

Figure 1: Bar chart with order properties (rows) and orders placed in sequence (columns).

Resolving this task is similar to generating a series of decisions (with reference to board games like chess, you could also call them moves) which, in total, schedule the order volume to be produced in such a way that the sequence meets the technical and capacity conditions of the production line and optimally achieves business goals (KPIs). The adaptive nature of such a sequencing AI is crucial because production conditions in the factory are constantly changing, so the AI optimization algorithm must also continuously adapt its behavior.

Transferability of optimization AI

Optimization AI is used in a similar way in scheduling scenarios in metal production or in field force management in the energy industry. In these cases, Gantt charts are used for visualization (Figure 2). The principle of adaptive optimization AI remains the same. Users benefit from tools that adapt and parameterize themselves, either in automatic mode or in the sense of parameter sets generated by the software itself for further optimization runs.

Learning predictions

The adaptation of the algorithm's own behavior follows an internal

machine learning logic. When the results of this learning logic are stored in connection with the behavior patterns of the AI optimization algorithm, the algorithm itself generates further qualitatively labeled behavior data, which, in conjunction with a classic, classifying AI, leads to the learning of long-term prediction patterns (predictions) for the business process to be optimized. Technically, this can be done with classifiers based on deep neural networks, gradient boosting or similar. Methods such as reinforcement learning are also useful here and are already in use.

Figure 2: Gantt chart with scheduling scenarios as well as KPI achievement levelsand target relationships.

Gen-AI-based RAG applications

Generative AI is currently used primarily in chat-oriented systems based on Large Language Models (LLM). The PSIqualicision AI Framework provides the tool PSIqualicision A2 for this purpose.

What makes this Gen-AI tool special is that it can be configured by users who are familiar with the business processes of the target applications, but are no data scientists at all. PSIqualicision A2 is configured by text documents that come from customer masters, without giving up control of their text data. A chat component allows users to talk about their processes and gain insights that are consistent with the content of the text documents provided.

Figure 3: GUI of PSIqualicision A2 (Ask and Answer).

So far, this has been used in the configuration and operation of RAG systems (retrieval augmented generation). Figure 3 shows the GUI of PSIqualicision A2.

the application, whether on-premise or in the cloud.

This is how Gen-AI-based RAG applications are created, which the

Outlook

What is exciting about this, is not only the benefits that are already available. Developments are moving toward not limiting the input that is provided to generative AI to human-generated texts alone. In the future, the aim will be to allow adaptive and predictive AI optimization algorithms to become input suppliers for the generative AI of PSIqualicision A2. This will further automate the use of adaptive AI optimizations and take their explainability and manageability to a new level.

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“Simply More ERP!”

As of now, PSI customers can use the new version of the PSIpenta/ERP 10 system. In the following interview, our Product Manager Flemming Hirschfeld explains the key aspects of this new version and the functions that define this release as a major release.

Multi-level package management in PSIpenta/ERP 10. Mr. Hirschfeld, let’s say you had to give version 10 a headline: what would it be?

At the IPA Annual Conference in November 2023, the title of the TechTalk on this was “Simply more ERP”. Maybe some of the participants can still remember it. The title of the presentation certainly gets to the heart of it. Much of what is hidden in version 10 is simply pure ERP functionality that simplifies life for manufacturing companies. Simplification sounds promising.

Looking at functionality and technology, which three innovations do you think are particularly relevant to this idea?

At the top of the list is, of course, the modularization and provision of PSIpenta/ERP on the group-wide Java platform. This is associated with a whole range of advantages. Among other things, it ensures that we are independent of operating systems and platforms. Breaking down the ERP system into modules also simplifies several topics, such as the installation and configuration of solution modules, as well as deployment, updates and operation. In second place, I see the topic of cross-structure material scheduling and picking, followed by framework production orders.

Allow us to take a closer look at the topic of material scheduling and picking first. What is new in in version 10 and why is it mentioned in the context of simplification?

First, let me say that this topic—and the following one, by the way—was developed in close cooperation with customers. Both originated in a project, were then further developed in an IPA working group and made it into the standard.

In other words, from practice for practice?

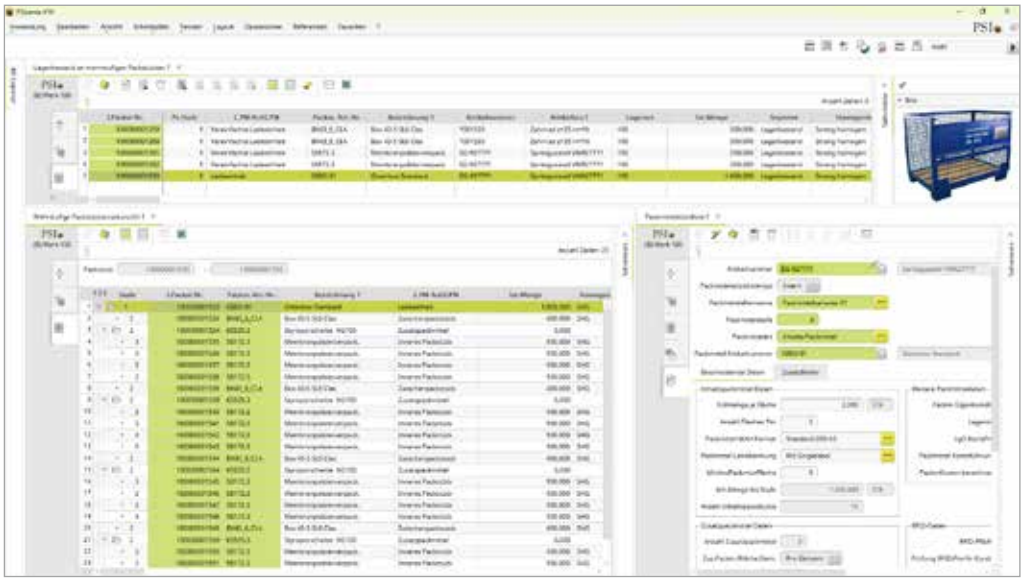
Absolutely. It is important to me that we are not only talking about it. We really live this philosophy. In cross-structure material scheduling and picking, we take into account that parts lists usually arise in the design. Their structure, as well as the derivation of dates in the ERP system, has so far followed this constructive logic—in simple terms, “from top to bottom”.

From a production point of view, however, this structure rarely corresponds to the necessary processing sequence. If components have to be processed earlier in some way, or can be moved to final assembly in terms of time, companies maintain a productive BOM in parallel to the constructive one. This works, but there is an easier way. In version 10, a structure is now automatically generated that is assembly-friendly, i.e. it precisely coordinates and synchronizes material and picking across the entire structure. This simplifies planning and saves a considerable amount of time and effort.

About Flemming Hirschfeld

Product Manager and Head of Business Development in the PSI Business Unit Discrete Manufacturing

Flemming Hirschfeld works between companies, technology and user experience. He determines which customer requirements and overarching company goals our solutions should fulfill. As a father of three, he also has what it takes to bring together colleagues from different departments to implement product visions.



Multi-level package management in PSIpenta/ERP 10.

Cycle is a good keyword to lead over to the blanket production orders for series manufacturers. Can you also shed some light on this function and explain the extent to which it is in the context of simplification?

In order to do that, let us take a quick look at the typical processes of a supplier. As a rule, the supplier calls up customer requirements via EDI every few days or, if in doubt, daily and controls production using a lot-sizing procedure. This means that the delivery call-offs are combined into a practical production lot size. The ERP system generates a production order for each EDI call-off. This production order forms the basis for the planning and generates all requirements.

Particularly with large orders, many orders are created at short intervals, which are always the same but still have to be checked, released and correctly posted again and again. This is precisely where the framework production order comes in. From version 10 onwards, companies can create such an order, for example, monthly for a certain quantity. This is not effective in terms of scheduling, but only forms a kind of bracket around the call-offs from a higher-level sales order and the production orders generated from it.

In other words, the production framework order is basically a kind of administrative trick to streamline and simplify production processes?

A small trick, but with a big impact—that is one way of putting it. The specific advantage is that production employees no longer have to select and post the individual and correct production orders, but rather the higher-level blanket production order. This minimizes sources of error, accelerates processes and is, of course, much simpler. Especially because nothing changes in the higher-level logic in the ERP system.

PSI customers can now use PSIpenta/ERP 10.

Simply more ERP—that really seems to be an appropriate title for PSIpenta/ERP 10.

Thank you for the exciting insight!

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Central Tool for Efficiency and Sustainability

The bilstein group, an international manufacturer and supplier of spare parts for passenger cars and commercial vehicles, is optimizing its supply chain with the strategic planning system PSIglobal. Since the implementation of the system for supply chain network design, the group has been able to reduce the proportion of multi-stage deliveries by 12 percent and significantly reduce its carbon footprint. The software helps to calculate complex scenarios and provides reliable data for strategic decisions in real time.

In logistics, there is no room for intuitive decisions. Instead, algorithms can help to sift through huge amounts of data and make precise decisions at breakneck speed. This data provides the basis for quick and informed decisions. Particularly in the supply chain, such systems are indispensable for optimizing processes and responding flexibly to challenges.

PSIglobal software for supply chain network design.

In this context, supply chain network design (SCND) plays a crucial role. Systems like PSIglobal harmonize the available data, prepare it for analysis and offer comprehensive scenarios with which companies can run through various decisions and evaluate their effects on production, storage and transport processes.

One example of the successful application of such technologies is Ferdinand Bilstein GmbH + Co. KG, known under the umbrella brand bilstein group. Founded in 1844, the family-owned company combines the product brands febi, SWAG and Blue Print and offers a comprehensive range of technical wear parts for vehicle repair. The bilstein group, which delivers to over 170 countries worldwide, has implemented Divisional Network Planning & Design to strategically optimize its supply chain network.

"In order to optimize the group-wide supply chain network, the Divisional Network Planning & Design was set up in the company in the 2010s," explains Fabian Hilbrich, Manager of the Division at Ferdinand Bilstein. Towards the end of the decade, the company was looking for a software that could continuously map the network and prepare it for future challenges. "We became aware of PSIglobal at LogiMAT 2019 and made initial contacts with PSI Logistics," continues Hilbrich. After a proof of concept during the pandemic, the system was officially purchased and implemented in September 2021.

Previously, the bilstein group often had to rely on external consultants for network analyses, which was both time-consuming and costly. "In the past, these analyses sometimes took a year and by the time the results were available, they were often already out of date," says Hilbrich, describing the initial situation. With PSIglobal, it is now possible to carry out such analyses internally and in the shortest possible time. 'Now we can do it ourselves at the push of a button and get results based on the latest data,' adds Hilbrich.

A key element of this success was the customization of the software. "We wanted to use the routing algorithm cleverly, not only calculating the optimal flow of goods through the transport network, but also mapping the warehouse processes precisely to achieve the most accurate cost situation possible," explains Hilbrich. Before the implementation of PSIglobal, cost calculations were mainly based on derived historical values, which led to inaccuracies.

"With the combined calculation, influences of the batch sizes and transport units, as well as the picking effort for individual order items, are now included in the cost calculation," he explains. This makes it possible to distinguish whether items are picked manually or au-

tomatically and whether they are small quantities or larger containers. “With regard to transport costs, the latest rates are always taken into account, which is a crucial factor given the volatility of freight costs,” adds Hilbrich. It also allows intralogistics conditions to be mapped precisely. For example, the items stored at the locations were assigned to the respective storage areas, such as high-bay warehouses, small parts warehouses or block storage areas. Their picking and storage costs were determined on a pick-by-pick basis and stored in the system.

Based on this information and the existing rates for internal relocations and external deliveries, the bilstein group can determine exactly which order incurs which logistics costs and under which conditions. This enables the company to make strategic decisions on how items should be stored in the best possible way to meet both sales volumes and cost requirements.

A key factor in the bilstein group’s decision to purchase was the option of network modeling and optimization. “With PSIglobal, we can realistically link the intralogistics parameters at the locations with the transport costs and thus determine the optimal routes for our shipments,” says Hilbrich.

The intelligent logistics network routing calculates the best routes from source to destination, taking into account all relevant factors. Data preparation and harmonization takes place in both febi’s data warehouse and in PSIglobal. “With an interface to the data warehouse, the system now offers us a transparent overview of the article structures and their distribution across the locations as needed,” Hilbrich continues.

Meanwhile, the planning software is used daily in the division, and complete data updates are carried out weekly. “We use it to calculate specific scenarios, focusing on four factors: customer service, sustainability, capacities and profitability,” says Hilbrich. This combination enables the company to find the optimal compromise for the respective issue.

Insight into the material flow at the bilstein group.

Another advantage is the consideration of sustainability aspects. “With the integration of an emissions calculator, we can calculate the carbon footprint of our transport services in accordance with the EU standard DIN EN 16258,” explains Hilbrich. “This is particularly important in order to take into account the EU’s Carbon Border Adjustment Mechanism (CBAM) and to minimize reporting efforts and compensation payments.”

Support of risk management

PSIglobal also supports the risk management of the bilstein group. By calculating scenarios, the effects of location changes or shifts in the product range can be identified and taken into account at an early stage. “We can use the various scenarios to prepare for forecast growth and calculate alternatives consistently,” summarizes Hilbrich.

How successful the implementation has been will be shown by the results achieved: “We have been able to reduce the number of multi-level supply chains by 12 percent, which has led to a noticeable reduction in internal group transport and double handling at our logistics locations,” explains Hilbrich. “This has not only increased our efficiency, but has also had a positive impact on our carbon footprint.” This makes PSIglobal an essential tool for efficiency and sustainability in the bilstein group’s supply chain network.

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Interview: Insights into PSImetals Demand & Sales Planning

Resilient Supply Chain—Part 1 of 3

Demand & Sales Planning in metals production requires navigating a complex supply chain with long lead times, limited capacity, and shifting demand. Stakeholders involved in forecasting and planning often have conflicting objectives and key performance indicators. The challenge is finding an optimal balance between sales revenue, production efficiency, and material holding costs.

In this part one of a three-part interview, the Production manager asked Pascal Moinier, Senior Consultant at PSI, about the features and key aspects of the PSImetals Demand & Sales Planning for the metals industry.

What is Demand & Sales Planning for PSI?

PSImetals Demand & Sales Planning (DSP) covers all supply chain processes that end with the confirmation of a delivery date to a customer. We can distinguish three main processes within demand and sales planning: demand forecasting, sales and operations planning (S&OP), and order acceptance, which interacts with the ERP system to confirm the order. These processes are still often managed in isolated systems with the help of multiple Excel spreadsheets. PSI's goal with its product is to ensure comprehensive transparency of the supply chain, to ensure that processes are not only executed and monitored, but that the underlying decisions at one level are also made visible at other levels, and can thus serve as a basis for decisions there.

Forecasting works at a detailed stock-keeping unit and market segment granularity. Do you recommend solving the capacity plan at the same level of detail?

Not really. In our experience, once a consensus has been reached on the forecast and the calculations for capacity balancing begin, applying rules or master data at the granularity level of storage units or market segments drastically increases the data volume and runtime, but does little to improve the quality of capacity balancing decisions.

In this case, an aggregated PSI model with multi-level alternative route planning delivers the same quality of results at much lower cost and in a shorter time. The calculation can then concentrate on special planning parameters. Ultimately, the online order acceptance takes over the task of checking the technical feasibility of the

Pascal Moinier, Senior Consultant at PSI.

product, as well as calculating possible production routes and their alternatives, while the so-called Due Date Quoting Engine (DDQ) compares this request with the capacity plan in order to determine a reliable delivery date.

We recommend using an appropriate level of aggregation at each decision point. With the help of our integrated supply chain model, we ensure the connection between the aggregation levels. When I apply the different levels to our product portfolio, we offer the possibility to manage and monitor demand in the Demand Manager, balance demand and capacity using S&OP, and ensure synchronization with ERP during the Due Date Quoting process. The DDQ process ultimately confirms the delivery date for the customer, taking into account alternative routes, available materials and the S&OP balancing results.

You mentioned Sales & Operations Planning. Could you explain it more?

The S&OP process follows a five-step approach. It begins with data collection and analysis to learn from past results. In this area, we benefit from our integrated production management environment, which provides both current and historical data. Our service platform also allows us to connect to external systems to gather additional

market information that gives us an even more complete picture.

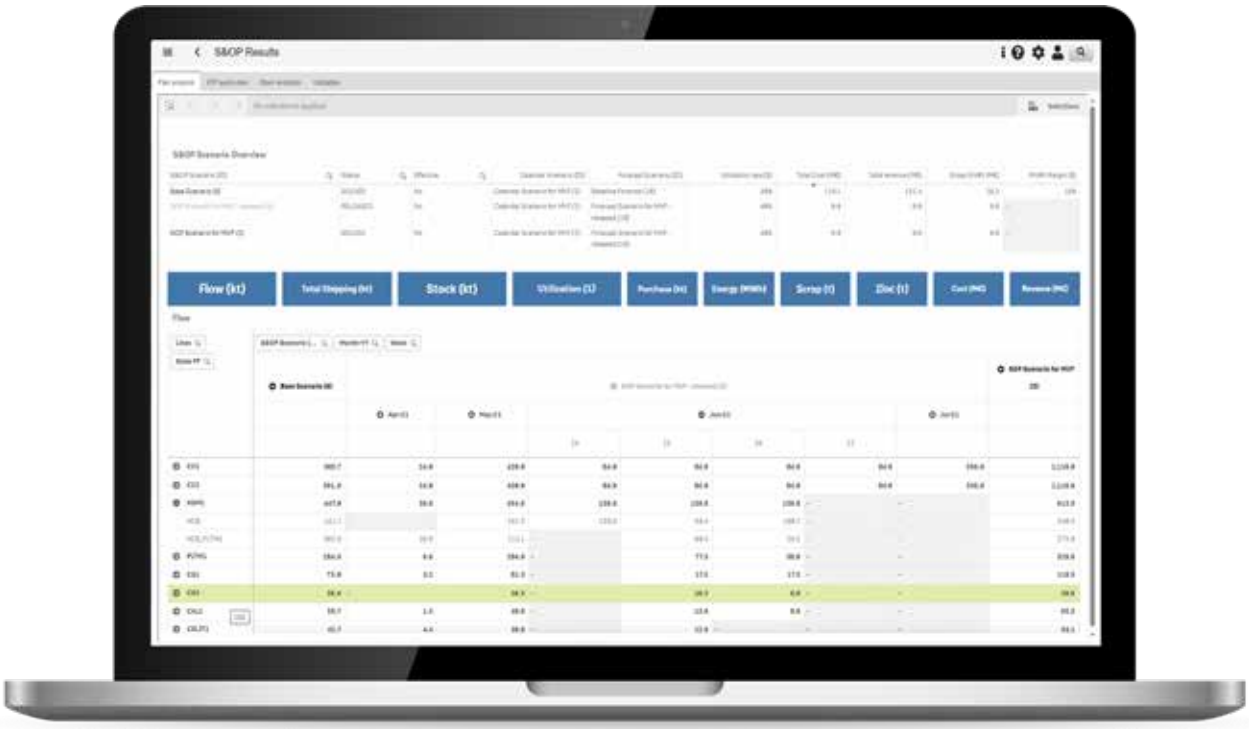
The next step is the demand planning, where forecasts from various sources are collected to help planners create a coordinated prediction. We provide specialized software for this, which I will discuss later (Editor: Part 2 of the interview series). After demand planning, the focus shifts to preparing available material. Here, a complete overview of past production helps to save a lot of time in data validation and checking planning parameters, which is crucial for the next step: capacity balancing calculations.

How about sustainability?

The S&OP calculation promotes cross-departmental collaboration by bringing together the teams responsible for procurement, production, logistics and sustainability to ensure that resource availability is considered holistically. In addition to existing key performance indicators (KPIs) for service and capacity utilization, new indicators must be introduced to track and ensure the desired use of renewable energy, recycled materials and local procurement of resources.

How do you ensure PSImetals makes a resilient and a reliable Sales & Operations Plan?

The resilience of a plan starts with the design of the plan creation process. In general, S&OP begins with the participants in the planning process agreeing on a supply chain model and key variables such as output, productivity, product catalog, production routes, plant calendar, profitability, and demand forecast.



Sales & Operations Planning Result Analysis.

Involving everyone in the process and using a shared model to resolve conflicting objectives can reduce uncertainty. The model should also be regularly validated by reviewing the key parameters and comparing the model values with the actual values. These reviews are usually conducted in line with the planning cycle, but can be more frequent in times of crisis. A responsive, integrated system improves control over all planning parameters.

It is also extremely important to define which market segments should be prioritized and which routes should be given preference. Giving all stakeholders full access to the agreed planning strategy ensures that the calculation of the plan is transparent for everyone, which in turn provides greater visibility and controllability.

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Harmonization with PSImetals

In their latest steelmaking transformation project, the Nordic and US-based steel company SSAB has selected PSI to design a digital template that will support its digital renewal journey. The project will ensure that new business processes and systems are ready and tested for starting up the Luleå mill at the end of 2028. It will further create a template with modern processes and tools that can be leveraged to reach a more harmonized landscape within SSAB, and deploy new automated and integrated processes based on best-practice standard processes and tools.

At the first site in Lulea, Sweden, the implementation will include PSImetals Planning, Scheduling, Production Execution Solid and Liquid, Quality, and Logistics as well as a modern and standardized Level-2 and Level-4 Integration. The PSImetals software solutions will cover SSAB's steelmaking processes in the new integrated mini-mill and cold rolling complex, covering the production process from scrap supply to finished goods.

From left: Jörg Hackmann (Director, PSI Business Unit Process Industries), Maria Germain (Head of Production Platform, SSAB), Myriam Mensing (Director Division TAP, PSI Business Unit Process Industries), Niko Korte (Head of Fossil-Free Business Platforms, SSAB).

"When we started looking for the right partner, we had a couple of criteria. First of all, where do we get the best experience? Who has the most dedicated software to the steel industry and who has standard processes and enables what we call the template approach? PSI ticked all of those boxes. Production digitalization is really important for SSAB. We are building a greenfield mill, which means that we can design things from ground up based on better utilization of data, for example for better process control, for better predictive quality control. And there it's really important that we have the right partners and the right tools to support us in that change," says Niko Korte, Head of Fossil-Free Business Platforms at SSAB.

> *When we started looking for the right partner, we had a couple of criteria. PSI ticked all of those boxes.*
>
> **Niko Korte, Head of Fossil-Free Business Platforms SSAB**

SSAB is a global steel company with a leading position in high-strength steels and related services. The steelmaker aims to be the first, in 2026, to offer fossil-free steel to the market and largely eliminate carbon dioxide emissions from their operations in around 2030.

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Event: “Moving Forward for Discrete Manufacturing”

38th IPA Annual Conference 2024

Themed ‘Moving Forward for Discrete Manufacturing’, the 38th IPA Annual Conference will be held at the Steigenberger Hotel at the Chancellery in Berlin from November 14 to 15, 2024.

The IPA is the independent association of all PSIpenta customers and promotes the exchange of information about the use, range of functions and possible applications of the software products.

Dr. Herbert Hadler (right), business unit manager at PSI, presents the IPA Customer Award 2023 to Lars Barnewold (left), Head of Production & IT at GHH Fahrzeuge GmbH.

Together with customers, business and system partners, PSI experts in discrete manufacturing will once again discuss innovative approaches for the further development of ERP and MES systems this year. The agenda for this year’s event offers numerous lectures and workshops on this topic, as well as many opportunities for exchanging ideas. The partner exhibitions, where participants can also obtain additional information, are another professional highlight. The expanded PSI Marketplace (formerly PSI App Store) will also be presented at the event.

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EVENTS

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Under the category “Trends” on our website, you will find further interesting and in-depth articles on production, logistics, energy, AI and mobility.

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