Extension of the PSI*metals* Caster Scheduler at ArcelorMittal Tubarão

Trust Matters

PSI

EDITORIAL

Dear readers,

Are machines able to think? This is a question computer scientists have been asking themselves as far back as the 1950s. In those days, artificial intelligence (AI) was still considered to be science fiction, but nowadays it forms an integral part of our lives.

AI is becoming increasingly significant in the industrial sector too. At PSI, intelligent decision-making is already an essential part of various software solutions for production management. In PSImetals, for example, a sensitivity analysis checks whether a production plan is feasible and robust before its release. Augmented reality glasses help users in the warehouse or who work on quality management on site to easily capture material data or error information. Our statistical process control monitors and correlates production processes and quality data in order to predict quality defects and

to enable preventive maintenance to take place.

What these examples and AI technology have in common is that they are all driven by large amounts of digital data. Although AI concepts have been around for a very long time, it is only today's Internet of Things that enables these concepts to be implemented. The customer solutions based on PSImetals software collect and analyze production data from the raw

material through to the finished product. This extensive pool of historic and current planning and scheduling data allows processes to be designed in an optimal way and makes it possible to forecast changes within a system environment.

As you can see, AI represents a new type of data linkage, which demonstrates new possibilities for a variety of markets. I strongly believe that industrial intelligence will shape the future of production management. AI is therefore of strategic importance for PSI.

Warm Regards

Luc Van Nerom
Deputy Managing Director
PSI Metals

CONTENTS

Extension of the PSImetals Caster Scheduler at ArcelorMittal Tubarão

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For almost 16 years ArcelorMittal Tubarão (AMT) has been a user of PSImetals's Caster Scheduler for daily scheduling. In 2017 a project was performed in order to review the plant's planning, scheduling and production processes and to extended the PSImetals solution to the weekly planning. The initiative paid off, resulting in an estimated 4.3 MUSD in cost savings per year.

Since the plant's operation start-up in November 1983, ArcelorMittal Tubarão management has determinedly focused on the sustained search for innovations and improvements of its processes and products. Together with a business consulting company they developed a strategy where they continuously invest in new technologies in order to expand the facility's production capacity. With the increased variability of the order backlog for rolling at the AMT mill, there was a great need for an evolution in the production planning and scheduling processes to guarantee order fulfillment without affecting the operational stability of the steelworks. In this regard, an extension of the scope of the functionality of the Caster Scheduler to include weekly planning was an important part of the management's strategy to increase the productivity of the steelmaking mill.

ArcelorMittal Tubarão

The flat steel production process starts at AMT, an integrated plant located in the state of Espirito Santo, southeast of Brazil. The unit has a production capacity of 7.5 million tons per year of slabs and 4 million tons of hot rolled coils. Recognized for excellence in quality, it allocates 4 million tons for the domestic production and 3.5 million tons for the most varied world markets.

Tubarão and the unit ArcelorMittal Vega are part of the ArcelorMittal Group, the world's leading steelmaker present in over 60 countries with industrial units and commercial representatives. Together, the two plants supply the flat steel segment producing slabs, hot-rolled coils, cold-rolled and galvanized coils traded in the domestic and international markets. It is an integrated process resulting in a high quality special steel product mix.

The market forces us to act

Over the last years the requirements of the metals market on a steelmaking company have changed considerably. Basically, a modern steelmaking company should be fast in designing and implementing new products with small procurement time and needs to keep inventories low from a financial perspective. Only if the company

has such a flexible system of production it is capable of meeting the customer needs optimally while keeping costs low.

In order to meet these demanding requirements it is necessary to adopt new growth and operational strategies. The plant managers have to think about innovative solutions for production planning and scheduling systems that are adherent to the current needs but also easily adaptable to the changes in the market. AMT has early recognized these constantly evolving market requirements and the great potential of the PSImetals Caster Scheduler solution to be the means for meeting the overall goal of the plant's optimization.

Reduced production costs through optimization

Since a continuous caster aims at a high-speed casting of high-quality steel to meet the demand for widely varied products of increasingly severe specifications, optimizing it generally reduces the producing costs of production and planning. Based on new business requirements, ArcelorMittal Tubarão
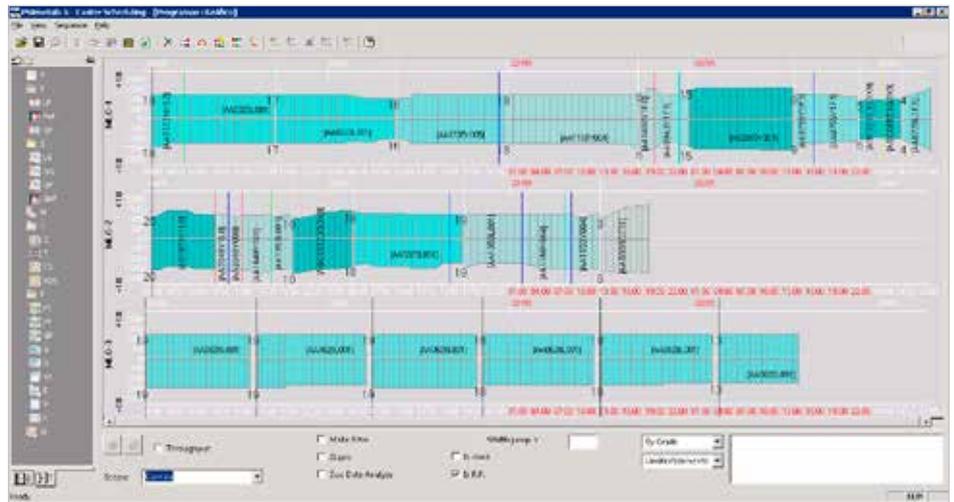
Plant program for ladle and tundish.

performed a project for extending the PSImetals Caster Scheduler solution to include Weekly Planning.

Starting from such production data as due date, grade transition, nesting (upgrading), tundish wear, casting speed, metal flow, up- & downstream, etc., the extended PSImetals Caster Scheduler solution creates a midterm scheduling scenario (weekly horizon). This scenario optimally meets the overall goal set of the facility while providing good responsiveness to changing production and market circumstances.

Motivation and goals

The main aim of the AMT management was to improve the order fulfilment while taking into consideration aspects such as prioritizing and ensuring on-time in-full delivery of orders from the customers. An increased weekly volume completion rate through balancing the casters, and strategically improving the way of scheduling the transitions and sequences of orders and volumes for each steel quality, were also one of the main expectations from the Caster Scheduler extension. Optimally, the tool should plan orders and ensure smooth transitions in qualities and width of the slabs according to the grade book in order to minimize production costs. An increased sequence of heats per tundish, a maximization of tundish usage through an optimal sequence length, reduction of the number of width changes, but also appropriate response to priority orders, were also goals of the project.

The level of complexity of the project could be described as demanding since there were several obstacles and peculiarities to master. For example, it was important to better

The Tubarão plant from the air.

anticipate the planning of large orders to be shipped by sea since planning was more linked to the shipment loading flow at the harbour than to the order due date. Also Tubarão's Caster Scheduler tool creates a 5-6 days weekly plan over three casters in parallel (+/-60000 tons schedule), which is a very challenging process.

Results

Since 2001, PSImetals Caster Scheduler was in use by AMT predomi-

- Minimization of transitions between different steel grades, allowing for a 17 % decrease in the production mixed grade slabs.
- Reduction on the number of conical slabs produced due to width change from 36 to 30 per day.
- Increased tundish utilization from 8 to 10 heats in average.
- Reduction of slabs produced without allocation to orders by 50 %
- Reduction on the time needed to create a new schedule by 80 %

are needed to build up such a complex plan.

This project showed that PSImetals' ability to combine the benefits of an approved standard solution like configurability, extensibility and flexibility with the necessary plant-specific features considering the particular conditions and constraints of the customer is essential for both new and ancient collaborations. Even after many years in use, the software can be easily extended and configured to meet the cus-

Results of the extended PSImetals Caster Scheduler solution at ArcelorMittal Tubarão.

nantly for daily planning. After the decision to extend the system to a weekly scheduler, the project was conducted within six months and after some adjustments, parametrization and tuning it went live in May 2017. Shortly after the extension, AMT was able to obtain several positive results. The main goal of the management to improve order fulfilment was achieved through a change on the scheduling strategy and the increased scheduling horizon. Among other results, the following benefits were achieved:

New customer-supplier relationship

In general, the extension of the PSImetals Caster Scheduler solution at ArcelorMittal Tubarão plant met its management's strategy to increase the productivity of the steel-making mill. With its help, potential gain of 4.3 Mio USD costs savings per year with a great reduction of annual lost productivity and stops could be achieved. Moreover, when earlier the total time to complete a planning schedule for one week plan was three days, after project only three hours

tomer's needs and demanding market's requirements. ArcelorMittal Tubarão management's trust and the ability to see the potential in PSImetals software significantly contributed to the success of this project that brought the customer-supplier relationship to a whole new level of cooperation. ◉

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Interview: Dieter Deutz and Dr. Herbert Hadler, Managing Directors of PSI Automotive & Industry

"We Cannot Shape the Future Without IoT"

How can medium-sized manufacturing companies face the challenges posed by digitization?

Dr. Hadler: Medium-sized companies need to tackle two things. On the one hand, they need to use modern interfaces to connect all process chains, i.e. to integrate their own systems with suppliers' and customers' systems. On the other hand, medium-sized producers are able to harness the capabilities of their modern systems. By doing so, a company is able to make processes more efficient, shorter and more resilient.

Mr. Deutz: And we're talking about more than just transparency and horizontal and vertical integration. Consider, for example, the industrial Internet of Things, cloud computing or big data. So benefit-driven investment planning will ultimately be essential for medium-sized companies. What needs to be done, when, and how? Having the right partners is a crucial part of this process. We are pleased to be ready to help where these challenges are concerned.

How should the core applications of a company be designed in order to be prepared as flexibly as possible for the smart factory?

Dr. Hadler: There will be more open, standardized and agile systems in the future. There is a move away from rigid, hard-coded solutions towards business process modeling. There will no longer be a monolithic "all-in-one" software for a company; rather there will be smaller, smarter solutions which are connected via workflows.

Backbone software will also exist; however, this will be temporarily supplemented by smart services, where necessary, that are downloaded over

Dr. Herbert Hadler and Dieter Deutz talk about the digital challenges faced by medium-sized companies.

the Internet and made available on a short-term basis. This means that agile companies will be able to tailor suitable software and infrastructure on a project-specific basis. A project management tool and smooth workforce management are essential for executing a major contract, such as manufacturing a large system.

But when the project is complete and the assembly order is pending, the process may look somewhat different. Process modeling is therefore becoming increasingly important, and consequently we are currently experiencing a renaissance of Business Process Management (BPM).

Mr. Deutz: We are moving away from the classic conveyor belt of the monolithic factory towards a dynamic overall system. This results in planning and technical control demands being immediately placed on the core applications, which need to be mapped to an agile, service-oriented software architecture. Applications become smaller, controlled via BPM and based on micro-services. As a user, we will be able to set the application up to be much more finely tuned. Processes and steps that the user does not need are dispensed with entirely.

Dr. Hadler: More and more users are being equipped with small, tailor-made apps such as PSI Industrial apps. The service technician can use the app to display the data that is essential to the specific application directly in the ERP or obtain the information that is of relevance to them.

How can an appropriate IT environment help to successfully implement innovative business models?

Dr. Hadler: Consider our customer Rhaetian Railway, with whom we have developed an excellent service management solution. Passengers can use an app to report a problem at any time, such as a stain on their seat, and this complaint will go directly into the ERP system. My client tells me where there is a problem with my product. A completely new business model!
Prognosis technologies such as predictive maintenance can be used to turn the whole process on its head. This means suppliers can tell their customers where and when their products will experience a problem.

Mr. Deutz: Taking things one step further, in future companies will sell production hours rather than machines. The supplier ensures that the end user uses a machine for as many hours of production as possible.

Dr. Hadler: And then there is the example of our customer Mosca GmbH, which manufactures strapping machines. The machines determine when the packaging material has been used up and automatically trigger a new order. This means the business model has been expanded to include the distribution of supplies.

How important is interaction with other platforms in the field of "Internet of Things", or IoT for short?

Mr. Deutz: Simply speaking, until now we only know when material will arrive in production, be processed or be transported onwards. Routes, times and conditions, on the other hand, are largely unknown. This will change entirely as a result of IoT. When assembling or altering pieces of material in future, you will be able to immediately log environmental parameters and processing results following each individual step.
Thanks to our solutions, processes can be specially adapted to the individual piece of material for the next step, for example default parameters such as speed or contact pressure, in order to remain within the intended quality range. This results in self-learning systems that evolve to be better and more efficient.

We are already familiar with predictive quality in terms of series production, but it is now possible to put it to use for single items. Thanks to IoT, the smart factory of the future will make highly accurate predictions about the quality of the individual pieces, since there will be a greater wealth of data about each individual piece available at all times.

Dr. Hadler: When—not if—IoT is enforced, data integration systems will become increasingly important. A strong ERP and MES partner becomes essential to medium-sized companies, because only in this way can the information provided by the supplier be correctly implemented in production.

Mr. Deutz: There will also be an influence on logistics at a fundamental level. Companies will deal with material flows differently. It will become possible to have a chaotic warehouse, since IoT chips can communicate at any time where which piece is located. We cannot shape the future without IoT.

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PSI presented high-speed ERP launch at the CEBIT 2018

Fast implementation, low costs

- Integrated ERP and MES solutions
- Predictive maintenance
- Optimized processes with AI
- And much more

Product report: Optimizing production processes in real-time or when planning or carrying out simulations

Predictive Optimization with Deep Qualicision

Deep Qualicision connects the Qualicision optimization machine with neural networks and machine learning based on conflict of objectives. This solution principle learns to efficiently adjust parameters so that they can be optimized in advance.

The Deep Qualicision application can be used to shape efficient, multi-criteria decision-making based on individual decisions, consistently taking into account conflicts of objectives in the business processes being optimized. In addition, the priorities around the criteria can be learned so that con-

uling production orders, the user can either optimize the production process in real-time or for the purposes of planning or carrying out simulations.

Offsetting Discrepancies

A scenario which occurs very frequently in practice is that now and then there are significant discrepan-

ancies in the form of differences between target and actual sequences for instance could be avoided and dealt with preventively where appropriate. Studies show that the deviations mentioned above are partly a result of a mixture of process anomalies that occur spontaneously. These anomalies arise as a result of an unpredictable lack of resources, quality-related stoppages and breakdowns with suppliers, and definitely as a result of the mix of orders, which changes spontaneously.
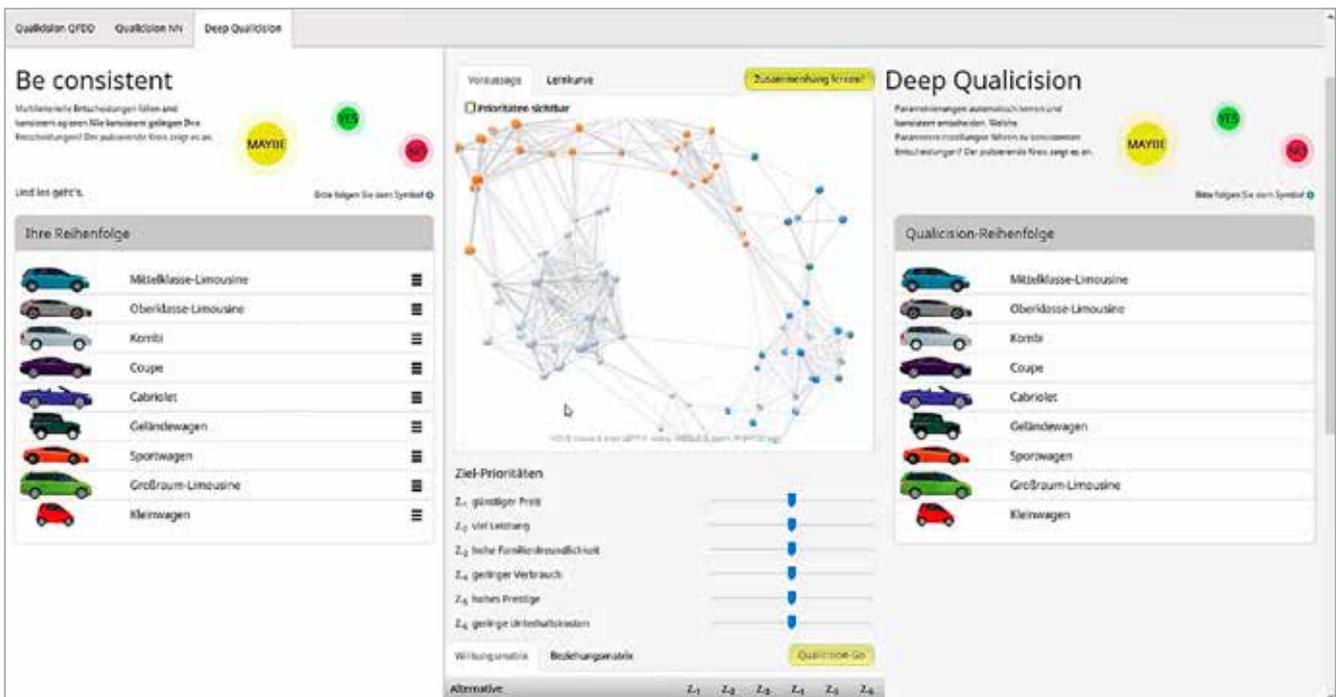

Figure 1 shows consistent priority settings for the criteria and objectives (KPIs) in Deep Qualicision.

sistent priority settings for the criteria and objectives (KPIs) are automatically recommended (see Figure 1). Deep Qualicision allows a deeper connection between individual decisions and the target criteria to be established using software. When applying this principle to the theme of sched-

cies between the process assumptions about the product resource performance parameters and the reality of everyday processing.

Although numerous industrial applications confirm that Qualicision real-time optimization can successfully offset these discrepancies, the discrep-

Learning from Historic Data

On the other hand, the same studies show that, in addition to the spontaneous anomalies, structurally-conditioned deviations between the target process and the actual process exist, which only become regularly apparent to the process operators after-

wards. It would be better if the regular structural anomalies of historic data could be learned automatically.

With Deep Qualicision-based predictive prevention, historic production sequences are analyzed and linked to the KPI-oriented optimizations contained in the original qualicision solutions. Qualicision conflict analysis is extended to ensure that it automatically detects anomalies.

Machine learning is used to learn property classes of products and resources from historic production sequences that go hand in hand with structural anomalies. The learned classes constitute the systematic anomalies. It is then possible to translate the anomalies into optimization objectives for the Qualicision optimization algorithm. This ensures that the optimization also offsets the systematic anomalies if the resources for the production process being optimized are available. The anomalies will be corrected with the help of the learned correlations, so to speak.

The example shown in Figure 2 is a simple demonstration of how the learned class formation is applied. The example consists of the vehicle sequences formed for the ranking relating to processes around making a decision to buy a car.

Ranked Decision Options

As far as the decisions to be modeled are concerned, the process for making a decision about what car to buy is
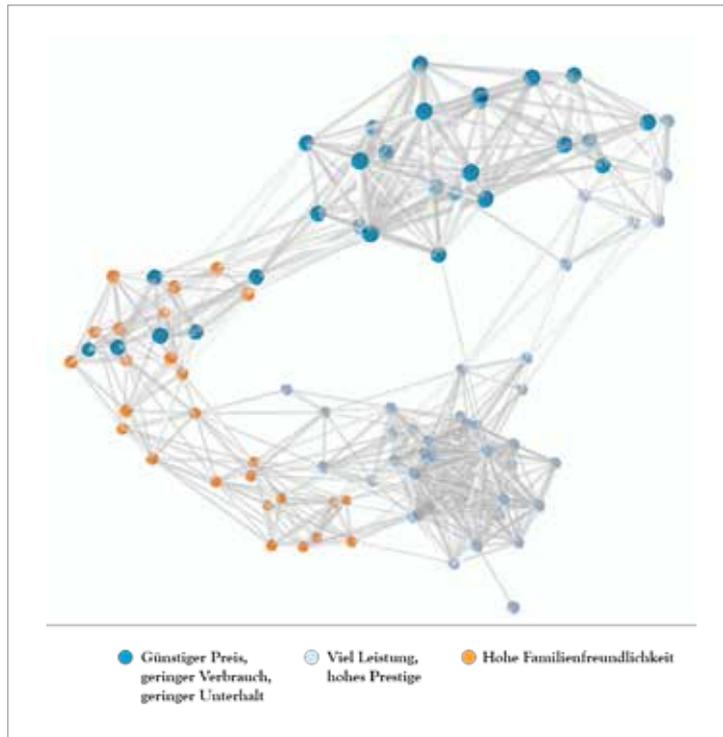

Figure 2 shows the consistent classes of decision options and rankings.

to develop ranked options in terms of types of car so that the ranking fulfills as many criteria as possible that are important to the individual making the decision. In simple terms, a ranking of this type can be compared to a production sequence, in which the types of car arranged in the ranking are provided.

The types of car are small cars, coupés, convertibles, mid-range saloons, luxury-class saloons, large saloons, estate cars, sports cars and off-road vehicles. In the example demonstrated, the criteria that play a role when making the decision are low price, high performance, low consumption, being family-friendly, kudos and low maintenance costs (see Figure 2). These criteria can be compared to production criteria according to which the sequence is formed.

The individual making a decision about the purchase ranks the types of car in question according to the objective behind their decision. The

ranking means that the remaining criteria, in the form of individual objectives, are implicitly fulfilled to a greater or lesser extent. As a result, certain other objectives are therefore indirectly negated or disregarded where applicable. For example, a ranking which prioritizes small cars and estate cars tends more towards low price, low consumption and possibly slightly towards being family-friendly.

Rankings which prioritize sports cars and convertibles tend more towards high performance and, perhaps, a desire for a bit more kudos, and disregard the low price criterion. In this instance, the low price objective is even negated in some way. If sequences now occur in a ranking which together imply negated criteria, these criteria are automatically identified as inconsistent anomalies by the process and are learned in their structure.

Overall, the Deep Qualicision-based method for the predictive sequencing combines past benefits gained from Qualicision optimizations with the possibility of automatically learning systematic anomalies in production processes. The first application scenarios with real production data are already proving to be successful. ◉

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Interview: Ingolf Heil and Dr. Hans-Thomas Nürnberg on AI methods as needs-based applications

Optimization through Self-Learning Software

We are seeing more and more frequently that artificial intelligence (AI) is encroaching into almost all areas of life. In an interview with Production Manager, Head of Software Development for PSI Logistics GmbH Ingolf Heil and Head of Engineering for PSI Logistics GmbH Hans-Thomas Nürnberg explain which AI methods PSI uses to transfer technology in the form of needs-based applications, and which role the technology transfer plays as part of this process within the Group.

Mr. Heil, why has PSI Logistics pursued the theme of AI in product development so vigorously in recent years?

Mr. Heil: It stood out for us as a logical consequence of the technological developments of the past decade. AI in itself is nothing new. The term was introduced more than 60 years ago, and since then its definition has become more concise in line with technical achievements.

Thanks to rapid developments in memory capacity and processor speeds, as well as in areas such as sensors and imaging, there are now technical possibilities for exploiting the potential of AI. It is important to make the relevant current options resulting from technological developments available in order to develop potential for optimization. Against this background, the PSI Group built up the relevant expertise at an early stage and pooled this expertise in a cross-sector community.

What effect does this have on product development?

Mr. Heil: For the PSI Group, it involves building our long-standing expertise in the field of AI methods and processes such as fuzzy logic or deep learning into the product development carried out by group subsidiaries. The joint development platform that the specialized subsidiaries work on supports the cross-sector transfer of technology as part of this process.

In this context, what is the significance of developments in sensor technology, imaging and robotics when it comes to software development?

Mr. Heil: Computer science generally forms the basis for the coordinated management of machines and processes. With continuing automation and digitization, it needs to tackle additional tasks in terms of intelligent information processing, for example.

As part of this process, computer science to an extent pools parallel and interdisciplinary developments across various technologies. Autonomous, self-driving vehicles on the road or in the warehouse, for example, do not know how to behave from capturing their environment alone. The information must be processed and implemented via control commands. The software takes care of all that.

So does this mean that AI describes control software processes?

Mr. Heil: This is only true to a certain extent. AI far exceeds this and is considerably more complex. It aims for an

Ingolf Heil.

Dr. Hans-Thomas Nürnberg.

adaptive software processes whereby the system independently learns to store information as empirical values, to process new and unknown data, and to make autonomous decisions. Establishing AI systems of this kind requires sophisticated programming. The first essential step is to teach, define, form clusters of and read patterns, characteristics and the corresponding responses for the operational applications.

How do you imagine this working in practice?

Dr. Nuremberg: PSI Logistics has already implemented a system of this kind for the baggage conveyor system at Hamburg Airport. It demonstrates a combination of imaging, image processing and specific software processes or AI methods such as deep learning, and the integration of neural networks, which already form an integral part of the PSI Group's products.

Can you give us a specific example?

Dr. Nuremberg: PSI Logistics has been working with its sister company PSI FLS Fuzzy Logik & Neuro Systeme GmbH to develop a neural network for automatic identification, documentation and tracing using surveillance camera systems, CCTV (Closed Circuit Television).

The PSIairport/CCTV video surveillance module is able to identify pieces of luggage individually through imaging alone without additional scanners being necessary, and can control and document the luggage's journey along the conveyor systems. It also detects any damage to the pieces of luggage, automatically reports corresponding changes and helps with root cause analysis.

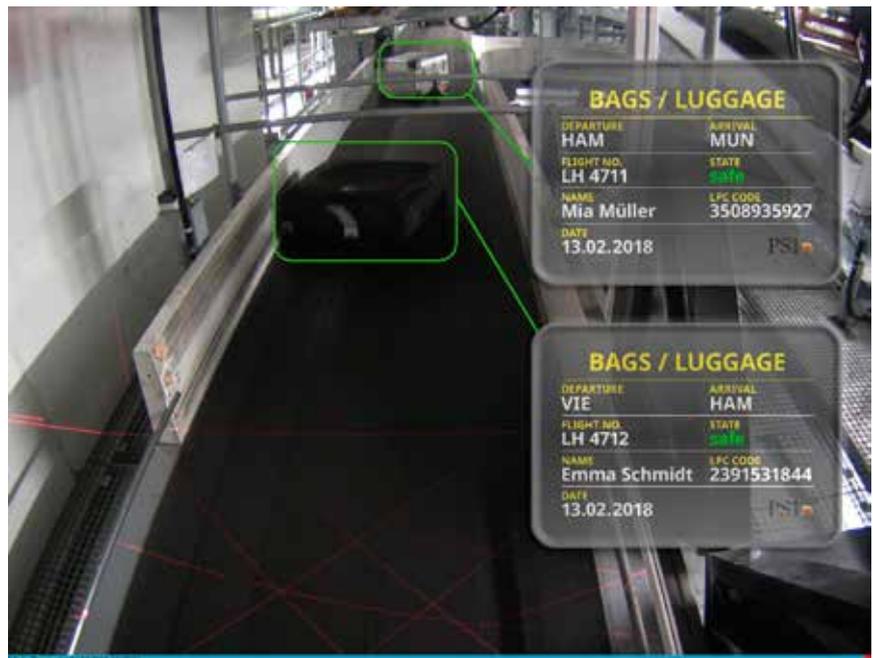**How does software learn to detect damage?**

Dr. Nuremberg: As far as deep learning is concerned, we have the neural network at our disposal. This comprises special algorithms, initially consisting of more than 2 000 images of pieces of luggage in different locations, "fed" from different perspectives. On this basis, the software "de-

tects" all other variants of baggage and individual characteristics.

At the baggage conveyor system, 200 high-resolution, ultra-HD cameras don't just capture each piece of luggage individually. The high resolution can even read the barcode at a higher read rate than with conventional scanners. The software links the images of the individual pieces of luggage across the entire conveyor belt to the barcode information and controls the flow of material. The advantages of this are that there is no longer a need for scanner technology, the error rate decreases and the need for resources for reworking—which for

PSIairport/CCTV uses imaging alone to identify individual pieces of luggage.

conventional processes relate to up to 10 % of the baggage volume—is no longer a concern. The service level increases and baggage handling as well as the condition of the case can be seamlessly documented and archived.

This also sounds like it could be significant in terms of intralogistics ap-

plications beyond the airport. Is this a possibility?

Heil: We are already working on solutions for completely different packages with a view to integrating voice-based applications. The outlay invested in deep learning can already be justified in terms of container recognition and supporting applications for quality assurance. We are currently exploring more options for applications for multi-criteria optimization of logistics networks. The potential for optimization as a result of integrating AI is far from exhausted where software development is concerned. It is still an exciting prospect. ◉

Product Report: Sensitivity Analysis—Decision Support for Production Planning

The way to the optimal production plan

An effective production plan is essential for most production processes. If it represents reality as closely as possible, the production plan can make the difference between profit and loss. Minimizing production costs and inventories and maximizing capacity utilization and delivery performance are well-known goals of many steel producers. But what to do when the amount of raw materials, the production capacity or the storage space suddenly changes due to supply bottlenecks or machine failures? How can the plan be optimized?

Despite an already optimized supply chain plan, there may be major delays in urgent orders, often due to undetectable capacity reasons. At this point, every operator faces the decisive question of what measures he or she can undertake in order to minimize this delay. After all, customer satisfaction depends on this, which is an important KPI factor. In practice, therefore, a quick solution is required to overcome the problem optimally and reliably. Both the time pressure and the high complexity of the plan, including large amounts of data, complicate the solution of the problem. The operator might go through a long process of input and output analysis, run different scenarios or just make a guess based on his or her experience—there would always be a great error potential.

Help with decisions

Alternatively the operator might consult a Sensitivity Analysis assistant regarding the question of which decision to make in order to achieve the most profitable improvement to the solution in terms of due date adherence and throughput optimization. The Sensitivity assistant offers the operator a great decision support by analyzing the shift planning, campaign resizing, shipment capacity, storage constraints, etc. It generates a constraint sensitivity report with a ranking of input constraints with respect to the highest return on plan/investment (ROI). Based on this report, the operator can take a fast and accurate decision.

Evaluable criteria

The solutions based on artificial intelligence and complex optimization algorithms often appear to end users as a black box due to their complexity. This inexplicability of the results of such systems is often an obstacle to the change and acceptance process of the end users of such a solution. Sensitivity analysis can help the operator to better understand this "black box" behaviour and guides him or her to a secure production plan.
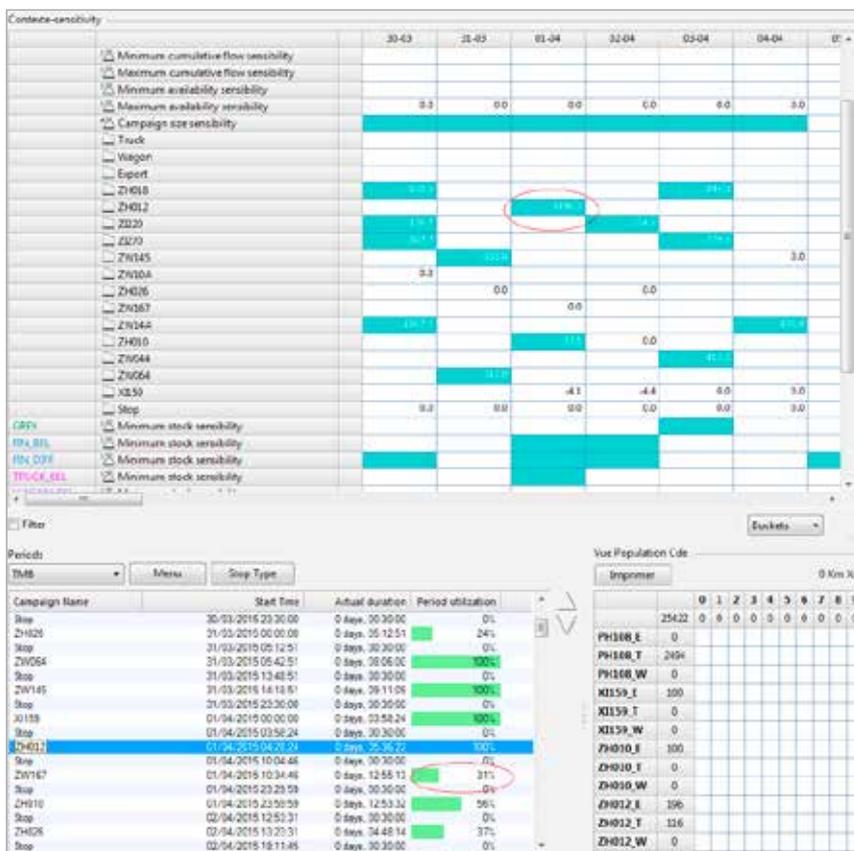
Highly-sensitive campaigns (e.g. ZH012 with -5100) have a huge influence on the production schedule, and should not be changed. When rescheduling, we use less sensitive campaigns (e.g. ZW167).

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R&D: Norwegian Public Roads Administration NPRA and PSI start research project Borealis

PSIroads/MDS predicts AI-based travel times

Following an official ceremony on the E8 corridor in the Norwegian Skibotn Valley, 150 km north of the Arctic Circle on May 8, 2018, General Director Terje Moe Gustavsen from Norwegian Public Roads Administration NPRA and Norwegian and Finnish government officials opened the Borealis research project for launch and trial of Intelligent Transport Systems solutions.

Together with PSI FLS Fuzzy Logik & Neuro Systeme GmbH, PSI Mines&Roads GmbH is supplying the system PSIroads/MDS for multi-criteria decision support for the control of traffic flows. The project is one of the 6 innovation projects under development on the E8 corridor as a part of the Nordicway 2 project co-financed by the European Union under the Connecting Europe Facility (CEF) funding mechanism.

In future, PSIroads/MDS based on PSIjscada technology, will determine the prediction of travel times, taking into account weather conditions and winter services, in order to enable the production industry to better plan transportation especially of critical cargo such as fresh salmon.

In addition to the decision support software Qualicision, which is already integrated in PSIroads/MDS, Convolu-

In future, PSIroads/MDS will determine the prediction of travel times, taking into account weather conditions and winter services.

tional Neuronal Networks (CNN) will be implemented to evaluate camera images that are continuously recorded along the route at important points. From these images, the conditions of the road surface will be extracted and used together with the locally measured and forecast weather data from the Norwegian Meteorological Institute as well as further input data for the prediction of travel times on the E8 motorway.

The research project is another important strategic milestone for PSI Mines&Roads and strengthens the development of complementary traffic management solutions based on Artificial Intelligence (AI). 🔵

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PSImetals UserGroup - Save The Date!

PSImetals Usergroup
13-14 November 2018
Swissotel Bosphorus, Istanbul, Türkei
incl. plant tour at
ASAS Aluminium in Akyazı/Sakarya

Event: PSI solutions for production control and logistics demonstrate innovative strength

Successful Hannover Messe Trade Fair 2018

An electric car, examples of how artificial intelligence (AI) is used in practice in an industrial setting and many innovations in the fields of Enterprise Resource Planning (ERP), Manufacturing Execution Systems (MES), and Warehouse Management (WMS) were demonstrated at the PSI stand at the Hannover Messe trade fair from April 23 to 27. Industrial applications for multiple artificial intelligence (AI) methods based on the Java-based PSI framework rounded off the trade fair presentation.

Many industry visitors and customers received detailed information about how AI and Industry 4.0 help face the challenges posed by digitization and capitalize on opportunities.

The electric car e.GO Life from Aachen start-up company e.GO Mobile AG in the middle of the stand made for a popular photo opportunity. PSI is working with the vehicle manufacturer to develop an integrated solution for production control and logistics.

At the event, visitors were able to experience how workflow-based se-quence control will make processes more agile in future, and how PSI software controls driverless transport systems. PSI solutions will enable one-off vehicle production to be carried out in line with series production conditions. Production becomes more flexible and versatile, and different processes can be implemented easily.

The Deep Qualicision application was presented as a trade fair innovation, combining learning using artificial neural networks and advanced fuzzy logic qualicision. Customers have been using PSI's AI solutions for many years in an industrial setting.

PSI demonstrated how AI, supported by Qualicision optimization software, optimizes tire recogni-

AI expert Dr. Rudolf Felix being interviewed on current topics.

tion, detection of damage to pieces of luggage, traffic management or load forecasting for energy management. AI technologies such as deep learning and neural networks were also put to use. Mobile solutions for production, transportation, service management and asset management, as well as a new solution for business intelligence, rounded off PSI's highly innovative performance in Hanover. ◉

The PSI fair stand in Hanover provided numerous visitors with information.

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Event: AISTech 2018—PSI at the biggest steel conference in the world

Philadelphia Hit by Steel Fever

AISTech 2018 in the City of Brotherly Love attracted around 6 000 visitors. A host of topics were discussed, technical presentations were delivered and contacts were made. The panel discussion was the highlight of the event. Under the headline "Trump and the Section 232 Steel Tariffs—Decisive or Divisive", this event offered an insight into America's steel industry today.

The world's biggest steel conference was held this year across an exhibition area of 85 000 square meters in Philadelphia's

Digitization? It's Important. Next Question!

An important trend that has emerged for the future relates to more com-

Franz Nawrath, PSI Metals Key Account Manager. "However, over the course of discussions I discovered that the interest is there. There is a certain air of optimism; the companies have money and want to invest and make a change."

Scott Wilson, Sales Director for PSI Metals North America worked with Scott Miller and Matt Hemmerkin of NLMK Pennsylvania to present the function of the dynamic material data connection at NLMK. The latest PSImetals "Matcher" functionality, which leads to improved hot-rolling schedules, has been followed with great interest.

Summary for 2018

The topic of digitization is relevant to American steel manufacturers too. "The IT systems at the plants are often out of date and are not able to respond to the growing needs of ever-changing business processes. This is where digitization provides an opportunity," says Nawrath. This is why many companies are repositioning themselves and are replacing the obsolete MES systems. ◉

Franz Nawrath, Scott Wilson and Detlef Schmitz at AISTech 2018 in Philadelphia.

former railway station, the present-day Pennsylvania Convention Center. Naturally, American President Donald Trump's current initiative to revive the U.S. steel industry by imposing tariffs on imported steel was at the forefront of discussions throughout the event.

plex customer requirements for optimized production processes, which should ensure that jobs are more secure. Surprisingly, the topic of digitization hardly featured in this respect, especially at the exhibition stands. "The focus was on neither digitization nor even on Industry 4.0," said

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Event: Software solutions for digital transformation at the fourth PSI Logistics Day

Digital Networking in Logistics

Exchanging information, networking and customer focus were the focus of the fourth PSI Logistics Day. On the eve of LogiMAT, more than eighty participants had the opportunity to discuss the topic of "Digital Networking in Logistics" in its various shades. In an exciting mix of current best practice examples and workshops, guest speakers and product managers from PSI presented a wide range of solutions for digital transformation.

D r. Rupert Deger attracted a great deal of attention with his lecture on "Disruption from Engineering Valley". Using production of the "e.Go Life" electric vehicle by way of example, the CIO of e.GO Mobile AG explained the significance of modular-designed IT for the concept of an "Internet of Production" (IoP).

End-to-End IT Solutions for Production and Logistics from a Single Source

With the ERP system PSIpenta, the Transport Management System PSItms and the Warehouse Management System PSIwms, e.GO Mobile AG is basing the production network for the electric vehicle entirely on an IT solution from the PSI Group. In so doing, e.GO Mobile AG is focus-

Dr. Rupert Deger, CIO of e.GO MOBILE AG, explained the importance of modular-designed IT for "Internet of Production".

ing on "agile pragmatism", according to Dr. Deger. "Where targeted access to existing data is concerned, modern standard IT is often not utilized to its full potential. That is what we do differently. Thanks to PSI's uniform system landscape, data from various systems can be taken and the most diverse of partners can be in-

volved, from design through to production and sales."

From Experience: The New Role of Software Systems

Holger Michael, Operational Manager at Nordkurier Logistik Berlin GmbH & Co. KG, and Dr. Christian Lippolt, Department Head of Logistics Consulting at Robert Bosch GmbH, used further practical examples to illustrate the role played by highly functional software systems in changing business models or in planning and optimizing logistics networks. The follow-up questions and lively discussions at the end of the presentations and workshops underline the high demand for information, which PSI Logistics has met and satisfied with the chosen motto "Digital Networking in Logistics". ◉

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Zukunftskongress Logistik
36. Dortmunder Gespräche

Following the motto: "All change—redefining an industry and science", discussions will be held about how companies will become fit for the future.

We will be attending the event in Dortmund on September 11–12, 2018 and look forward to seeing you there.

ZUKUNFTSKONGRESS
LOGISTIK
36. Dortmunder Gespräche
11. – 12. SEPTEMBER 2018, DORTMUND

Event: Successful attendance at Intertraffic 2018 in Amsterdam

Intelligent Mobility: Smart City and New Avenues

PSI presented innovative smart city solutions for mobility of the future. From March 20 to 23, 2018, more than 800 exhibitors from over 40 countries presented their products and services relating to the traffic and transport industry at Intertraffic in Amsterdam. The main topic was the digitization of road traffic. PSI Mines&Roads worked with PSI FLS Fuzzy Logik & Neuro Systeme to present the PSIroads/MDS powered by Qualicision software solution based on PSIjscada and the app-based incentive system ZOOF from V-TRON.

The PSIroads/ MDS, a winner of the German Mobility Prize in 2017, allows traffic flows in connected road networks to be optimized according to multiple criteria. The measures for controlling traffic are implemented telematically through integration into traffic management systems.

Mobile Solution Creates Conditions for Intelligent Traffic Flow Management

By extending and integrating the mobile solution from the

PSI presented innovative smart city solutions for mobility of the future.

Dutch-German smart mobility experts V-TRON, smart cities have met the prerequisites for intelligent traffic flow control. The app-based incentive system ZOOF enables use in urban infrastructures with little to no telematics and reinforces confidence among road users.

Those attending the trade fair also had the opportunity to find out

about the application and its benefits by attending the keynote speech delivered by Elmar Jaeker, Managing Director of PSI Mines&Roads, and the Dutch transport expert Erik Wegh.

Overall, attendance at Intertraffic constituted a great success for PSI. Constructive and promising discussions with potential partners and cus-

tomers have already led to concrete points of contact being established.

Summary

Thanks to their digital and innovative approach, PSI solutions provide for secure and reliable mobility and improved living conditions in cities and municipalities, particularly in the face of impending bans on vehicles. ◉

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Event: A visit to the regional meeting of the PSIpenta Customer Community in Berlin

How to Take Customers Seriously

As soon as you enter the room, it is obvious that something special is taking place. Customers and PSI staff stand huddled in small groups. There is an intimate atmosphere and a real buzz in the air. Today, a meeting of the "IPA Anwendergruppe Ost"—the IPA User Group for the East—is being held at GEA Refrigeration Germany in Berlin.

Dagmar Mahrwald has a kind word for everyone. She knows her customers well. Dagmar, a Berlin native, has been in charge of Customer Care at PSI Automotive & Industry for 16 years and in 2003 was responsible for

are currently tackling. Ms. Ritter is clearly delighted to be able to share her experiences of the PSI solutions. "For me, sharing experiences is what the IPA embodies. You can learn how other people are handling the program, what problems they have ex-

The tour of the plant generated technical questions and a positive atmosphere.

organizing a Customer Community IPA (PSIpenta User Syndicate) on a regional basis and for establishing five local IPA groups in Germany.

The IPA Embodies Sharing Experiences

The highlight of the day occurs right at the start of the proceedings. Anja Ritter from GEA delivers a presentation on the ways in which PSIpenta is put to use in practice. More specifically, she speaks about automatic receipt invoice processing and outgoing invoice dispatching — an issue that many commercial departments

perienced, and how they have solved them too."

Overcoming Similar Challenges

After the lunch break, the event continues with a tour of the plant where the delegates gain an insight into how compressors for refrigeration units are produced and assembled. The biggest are the same size as a pick-up truck and are used to cool entire stadiums in the Middle East. The delegates are eager to ask their questions, since many face similar challenges in their companies.

Later in the day, there are presentations from the Development unit of PSI Automotive & Industry. The new features of PSIpenta 9.2 are also presented. PSI experts and customers talk openly and honestly about the new, straightforward workforce management system for the service management module. "Today we have seen where the journey with PSIpenta 9.2 will take us. You can see that things are changing and that the things we are asking for are actually being put into practice," Anja Ritter is pleased to announce.

The IPA: A Success Story

Dagmar Mahrwald is happy with how the day is going too. "We think it's great that customers network with each other and share their experiences with PSIpenta. The IPA is a success story. In addition to the big annual conference consisting of numerous presentations and a varied supporting program, our customers are particularly enthusiastic about the regional meetings and working groups. The particular charm of these meetings is due to the fact that they are always held at a customer's premises. The customers are virtually their own guests and are able to be actively involved with product development and contribute their ideas to help us to further and continuously improve PSIpenta with a practical orientation."

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Event: Specific inquiries bring success to our trade fair appearance at LogiMAT 2018

Sustainable Logistics Solutions

Overall, PSI Logistics considers the 16th LogiMAT in Stuttgart, which took place in mid-March, to be a success: Many people registered their interest, with specific investment projects for standard products from the PSI Logistics Suite. In accordance with the trade fair motto "First-Hand Intralogistics—Digital—Connected—Innovative", industry visitors were able to visit the PSI stand to find out about a variety of new developments.

A live demonstration allowed an innovative IoT application for warehousing to be tested for the first time right on-site. Visitors were also informed of the benefits of an integrated and consistently networked IT infrastructure. People could also find out about options for building state-of-the-art technologies such as augmented reality (AR) and "Amazon Alexa", the digital voice control wizard, into value-adding processes in the warehouse.

Cloud-Based Solutions

There was also significant demand for cloud-based solutions for the PSIwms, which PSI Logistics offers as a full service provider for Application Management Services from its new data center. Managing Director Dr. Giovanni Prestifilippo sums it up as: "A trade fair of superlatives." "With our product offering, which also demonstrates the large number of qualified contacts, we are precisely covering the demands of the market for a future-proof IT infrastructure," says Dr. Prestifilippo.

New Features

The focus was on the latest functionalities for the Warehouse Management System PSIwms and PSIglobal, the planning and control system for logistic networks. Both systems were presented at Stuttgart in the form of the current release versions PSIwms 2018 and PSIglobal 2018.

"The huge interest shown in our solutions at the LogiMAT event increasingly reflects the high level of recognition gained by our standard products on the market, which have since re- ceived numerous accolades," reasons Dr. Prestifilippo.

EVENTS
www.psi.de/en/events

28.–29.08.2018	Top Soft—inspiring digital business Zurich, Switzerland	PSI Automotive & Industry
11.–12.09.2018	Zukunftskongress Logistik—36. Dortmunder Gespräche Dortmund, Germany	PSI Logistics
18.–21.09.2018	InnoTrans 2018 Berlin, Germany	PSI Group

PRODUCTION manager

PSI