Phone: +49 211 881 4449
E-mail: thilo.sagermann@sms-group.com
Thilo Sagermann

PRESS RELEASE

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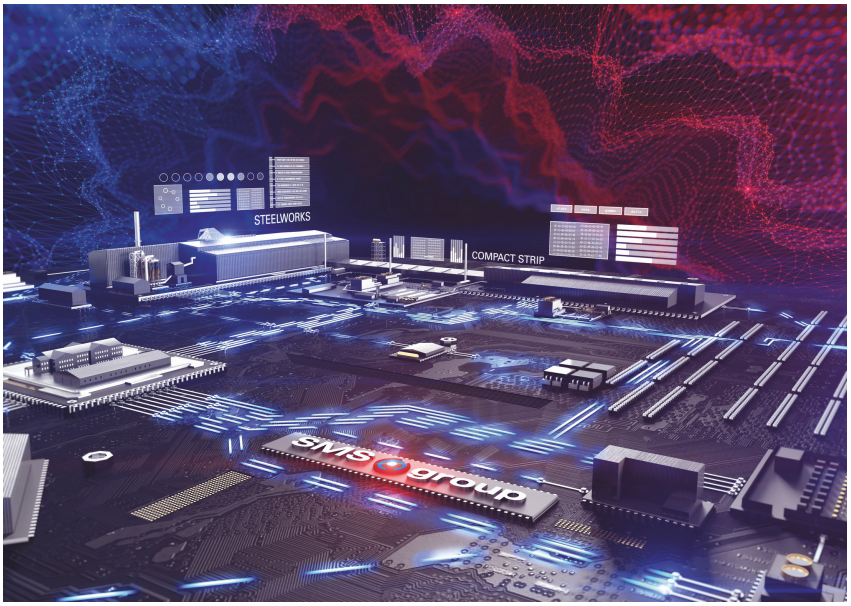
Noodle.ai and SMS digital offer three modules for production planning and control in a new Production Line Sequencing App

Major advancement in the digitalization of steel with new AI-based production efficiency application



Big River Steel, U.S.A., is regarded as the first learning steelwork.

Noodle.ai, a leading provider of Enterprise Artificial Intelligence® applications based in San Francisco, U.S., and SMS digital, headquartered in Düsseldorf, Germany and specializing in digitalization within SMS group, have launched their second jointly-developed application following the announcement of their collaborative partnership in June 2019. The new scheduling application for production planning and scheduling includes three modular applications that are also available individually. The three consist of a demand planning application, a pre-grouping application, and a line sequencing application.

These modules are their answer to the growing demand for smart production planning and are aimed not only at improving traditional performance indicators such as order due date compliance, but also at minimizing transitional losses, which inevitably occur with steel grade changeovers, jumps in the thickness or width, or changes in the process conditions.

By integrating new and existing applications, the whole planning process is further enhanced and automated with artificial intelligence (AI) – from longer-term planning for up to six months to short-term scheduling of line sequences across various production stages. The modular design of the new application is what makes this possible, and additional applications can be connected in the future with minimal effort.

The three new AIaaS (AI-as-a-Service) modules are fully integrated with SMS digital's manufacturing execution system, MES 4.0. The cloud-based applications with web interface can be easily run using a web browser.

Demand planning application: Enhancing demand forecasting with AI

Faced with a wide range of products combined with a variety of production parameters and dynamic order book changes, production schedulers have a massively difficult task when it comes to production planning optimization.

The demand planning module assists with the creation of production schedules by using AI algorithms to predict customers' future orders for specific products. It works up to six months in advance and the forecasts are directly incorporated into the production planning process. As time progresses, the predicted orders are replaced by actual booked orders. This significantly improves scheduling results, as it allows far-sighted production capacity plans to be created. The forecasts include several types of data: historical order data, sales data, product data, customer data, and other company-specific parameters, as well as external factors, such as market fluctuations. In this way, schedulers can easily turn the forecasts into real demand plans. That means more precise delivery dates can be given to customers and the order placement process is optimized for the sales team. The result is improved deadline compliance and more efficient equipment utilization.

Pre-grouping application: Improving production efficiency with intelligent grouping

"Pre-grouping" is a solution that brings the requirements of each production line together to form groups created in line with common product features, such as the steel grade or chemical composition for example, or using time-based rules. In addition, various KPIs can be included in the decision-making process. The size of the pre-groups created is directly determined by the results of demand planning. The pre-grouping application serves as an important bridge between demand planning and line sequencing, and offers crucial advantages in terms of overall production: increased production efficiency plus reduced transition costs and optimized inventory levels.

Line sequencing application: Optimizing profitability of scheduling decisions using advanced reinforcement learning

The line sequencing module takes the order book, groups the customer orders into heats, and calculates an optimal sequence of a selected subset of the heats for the caster for the next 24 hours. To calculate the heats and their sequence, the module optimizes a total

production cost function which balances the transition costs at the caster and the melt shop with customer order delivery requirements. At the heart of the calculation is a reinforcement learning algorithm that can accommodate almost any “black-box” cost component, and technical or best-practice constraints desired by the user. After the module generates its recommended sequence of heats, the user can manually adjust the sequence to his or her choosing, and the module will re-calculate the KPIs of the sequence in real time as feedback. In addition, the user can gain more insights by changing the optimization parameters to see their impact on the sequence. Custom versions of this module have also been developed for other production lines such as continuous galvanizing.

With these jointly developed products, SMS digital and Noodle.ai are helping steel plant owners to optimize the cost of producing customer orders while keeping delivery promises, by utilizing the existing set of production resources more efficiently. Noodle.ai and SMS digital utilize their pooled expertise in the fields of plant engineering and construction, process model development, and data science to enable customers to make fast and tangible improvements in profitability and to optimize their use of resources, which in turn helps to optimize product costs.

“These are great use cases of applying novel AI-based and reinforcement learning algorithms for enterprise business problems - specifically designed for complex manufacturing processes. Our mission of reducing waste is coming to fruition as these solutions, trained on our supercomputing platform, are able to evaluate trade-offs across a span of dynamic operational and business constraints that exceed the limits of rules-based software and human judgement alone” explains Chris Heuschkel, SVP and GM of Noodle.ai’s manufacturing business unit.

"It is only with these kinds of developments, which SMS group as a systems supplier designs and builds with its partners, that our customers are able to produce ultramodern materials in a cost-effective, environmentally optimized way," says Bernhard

Steenken, CEO of SMS digital.

About Noodle.ai

Noodle.ai is on a mission to create a world without waste. As the leading provider of Enterprise AI®, Noodle.ai pushes the limits of data science to give business leaders a view into the future, enabling them to achieve radical efficiency within their manufacturing and supply chain operations.

Noodle.ai, based in San Francisco, CA and founded in 2016, has invested in building a market-leading set of applications and a platform to enable the creation of the digital infrastructure and operational enhancements for process manufacturers and supply chain operators, powered by data, AI/machine learning and human/operator process knowledge. In the steel industry, Noodle.ai focuses on improving financial performance, measured by profit per mill hour, enabling more profitable scheduling decisions, lower unplanned downtime and maintenance costs, and increased quality and yield. Noodle.ai is a Series B corporation with investors including SMS group, TPG Growth, Dell Technologies Capital, and Mitsubishi Corporation. Visit Noodle.ai to learn more.

Press contact:

Gail Moody-Byrd | Noodle.ai

Chief Marketing Officer

gail.moodybyrd(at)noodle.ai

About SMS digital

SMS digital GmbH, the digital subsidiary of SMS group GmbH, and SMS group Inc. Digital Solutions are the joint market leader in the digitalization of plant and machinery used to manufacture and process steel and nonferrous metals.

Working in close collaboration with its customers, SMS digital develops innovative products for the metals

industry and benefits from a vast array of state-of-the-art R&D methods, metallurgical process expertise, and specialist technological know-how. With digital applications and the use of artificial intelligence, SMS digital is helping its customers move their plant and equipment successfully into the digital era.

SMS group is a group of companies internationally active in plant construction and mechanical engineering for the steel and nonferrous metals industry. It has some 14,000 employees who generate worldwide sales of more than EUR 2.9 billion. The sole owner of the holding company SMS GmbH is the Familie Weiss Foundation.