SIEMENS

Automotive and transportation

WEST-RU

Advanced simulation tools from Siemens PLM Software enable WEST-RU to deliver efficient and optimal production planning for new car models

Products:

Tecnomatix, NX

Business challenges:

Offering a wide range of services, including designing, developing, procuring and commissioning

Meeting customer-specified performance indicators

Planning and optimizing automobile plant facilities

Launching second simulation-enabled production planning pilot project

Keys to success

Employ Plant Simulation in the Tecnomatix portfolio for production planning, including implementing preventive problem/ resolution best practices

Design BIW shop buffer equipment using NX

Apply simulation at Ford Sollers plant (Yelabuga) to eliminate possible bottlenecks and optimize operations, then fast-track second buffer project launch

BIW project helps verify the accuracy of selected logistical models and planning solutions for welding and assembly shop at Ford Sollers (Yelabuga) plant

Comprehensive production planning services and solutions

WEST-RU provides engineering services and turnkey solutions to the automotive industry. The company focuses on welding and assembly processes, and performs significant material and equipment handling systems work. Its experience includes extensive Russian and European car body manufacturing projects, from end-to-end services starting with preplanning (when only basic production performance indicators and initial concepts are available), through manufacturing, process flow, equipment layout, etc.

WEST-RU meets varied customer requirements by developing suitable production system layouts and verifying them using simulation. Once the proposed shop or workcell layout is approved by the customer, the detailed design stage begins.

WEST-RU's global customers include BMW, Daimler, Audi, Volkswagen, Skoda, Ford, Mitsubishi, and Peugeot. Those it supplies extensive support to locally include Renault (Moscow), Peugeot, Mitsubishi (Kaluga), Volkswagen (Kaluga), Ford (Yelabuga), Ford (Naberezhnye Chelny), Daimler (Nizhny Novgorod), Skoda, GAZ, and AutoVAZ.

Simulation serves as the production planning foundation

In 2012,WEST-RU won an order from Ford Sollers to develop an optimal body-in-white (BIW) shop layout taking into account a variety of equipment and positions. The customer wanted to align all shop floor process flows and provide the expected capacity while making three different Ford models, all while utilizing the available equipment from a previous production project.

Ford Sollers is a joint venture of Ford Motors and the Russian company Sollers, which is located in Yelabuga (Tatarstan Republic). Ford Sollers manufactures the Ford Kuga and Ford Explorer; with the Ford Transit launching soon. The Yelabuga plant uses semi-knocked-down (SKD) assembly. The bodies are welded from pressed parts, painted, and assembled.

Ford Sollers selected WEST-RU to implement the project because WEST-RU had more than 15 years of experience with similar international projects, and was able to provide equally high-quality services to companies whose first language is Russian. WEST-RU was also chosen because of its experience with global automotive industry

Results

All plant production cells verified virtually

Manufacturing, procurement and commissioning completed on the buffer equipment for the BIW shop at Ford Sollers (Yelabuga); personnel and equipment productivity targets realized

Second buffer project well underway

trends, new technologies and solutions. Approximately 95 percent of the company's orders come from the German automotive sector. Another important factor was WEST-RU's office in Nizhny Novgorod, which is quite close to the Ford Sollers plant in Yelabuga.

Employing best-in-class PLM

WEST-RU uses solutions from product lifecycle management (PLM) specialist Siemens PLM Software, including the Tecnomatix® portfolio (integrated digital manufacturing solutions covering production planning, from process development to verification, modeling, 3D simulation, and optimization) and NX™ software (comprehensive computer-aided design, engineering and manufacturing (CAD/CAE/CAM) applications.

The Ford Sollers project particularly utilized the Plant Simulation solution in the Tecnomatix portfolio. Plant Simulation is a discrete modeling tool used to plan and optimize material flows, as well as resources, logistics, and productivity. Plant Simulation enables its users to create a digital logistical model suitable for exploring "what-if" scenarios. The software's wide range of analytical tools, statistical models and diagrams helps users to quickly evaluate various production options, which can significantly reduce development time and project implementation risks.

Plant Simulation is widely used in the global automotive and aerospace industries, as well as across numerous other industry sectors. The software is especially advantageous for top-level projects, such as for a site-to-site collaboration process, and for modeling individual work cells, lines and workstations. The objective of such simulations is to determine the interaction between equipment units, human resources, shops and packages in order to verify the entire manufacturing operating environment.

Among the firsts

The Ford Sollers project is one of the first simulation applications in the Russian automotive industry, representing a breakthrough for the region's domestic carmakers. "Even globally, not many automotive companies use such a tool in production planning as a corporate standard," notes Sergei Vasiliyev, director, WEST Manufacturing, WEST-RU Group. "The companies that do use advanced digital production simulation solutions are today's global leaders in the industry."

"NX played an important role in reducing overall project time and substantially improving design efficiency."

Sergei Vasiliyev
Director
WEST Manufacturing
WEST-RU Group

The Ford Sollers project began with the simulation of a buffer in the BIW shop and then was expanded to include the entire plant. The plant consists of three primary shops: the BIW shop, the paint shop and the assembly shop. They are largely independent facilities with their own regulations and different production cycles. The buffers located between the shops are intended to store the products. In order to correctly create and optimize the buffer configuration, work sequence and capacity, the input and output flow parameters must be correctly specified. In most cases, the shop operations have to be simulated to obtain the flow parameters.

Simulation is a compelling way to anticipate possible delays, such as situations when either humans or equipment would lag behind, by identifying logistical or handling issues, etc. Use of simulation enables users to readily identify bottlenecks and errors, and rectify them as early as the production planning stage.

Simulation can make a substantial difference in terms of productivity, because exceptionally accurate plant capacity estimates can be generated. However, to achieve such accuracy, the initial model has to be highly reliable, which typically requires extensive effort since there are so many equipment pieces and potential product configurations. Such was the case at the Ford Sollers plant, where Plant Simulation was used to develop a model and simulate the entire production process, including expected production output, ways to boost capacity, solutions to potential bottlenecks, and more.

Appyling simulation to greenfield and modernization projects

Simulation is particularly valuable for greenfield and modernization projects, where there is a need to increase car output or number of models while considering operational limitations. The BIW and assembly shops at the Ford Sollers plant represented greenfield projects while the paint shop represented a facility upgrade. Using Plant Simulation, issues were quickly identified and resolved in both projects, with the production schedules, proposed layouts, launch, documents and other items shown to be viable.

"Much depends on the accuracy of the simulation model," says Vasiliyev. "To develop such a model, we need very accurate data from the customer, and some of that data may be confidential. It takes significant time and effort. As the company is getting ready for a launch, not all data are immediately available; some aspects get changed on-the-fly. Still, using Plant Simulation, we were very pleased; we finished the project on time per customer expectations."

The Ford Sollers project's first stage addressed BIW shop buffer simulation. Several buffer configurations were developed and the one that best fit the customer's requirements was selected.

At the next stage, Plant Simulation was used to develop models of the BIW, paint and assembly shops, as well as the entire plant model. Having combined the buffer and plant models, WEST-RU conducted a number of virtual tests to analyze equipment capacity and utilization. The layout was adjusted to account for customer changes and another simulation cycle was run.

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Solutions/Services

Tecnomatix

Plant Simulation in the Tecnomatix Portfolio
www.siemens.com/tecnomatix

NX
NX CAD
NX CAE
www.siemens.com/nx

Customer's primary business

WEST-RU is a Russian engineering solutions provider, offering integrated services for welding, punching, handling and storage systems as well as comprehensive expertise in structural steel design. The company serves automotive and general industries, both domestically and internationally.
www.west-ru.ru

Customer location

Nizhny Novgorod
Russia

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Director
WEST Manufacturing
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Once the results were approved by the customer, WEST-RU began detailed engineering using Siemens PLM Software's NX™ software. With NX, engineers developed a thorough design of the buffer, including a 3D model of the buffer, handling equipment and structural steel foundation. The Advanced Simulation module of NX was used to perform a strength analysis of the latter in order to optimize its mass and meet load bearing requirements.

Project launch success

The engineering documentation has been released. "We have developed all the production drawings, and with them we have manufactured the equipment, delivering and commissioning it," explains Vasiliyev. Management described the launch as highly successful. Vasiliyev notes, "NX played an important role in reducing overall project time and substantially improving design efficiency."

Today, WEST-RU is designing the second buffer to be installed between the BIW and paint shops. The concept and simulation are well underway, with the project scheduled to be completed in 2015.

"Russian companies have started realizing the clear advantages of using digital simulation for production planning," says Vasiliyev. We see increasingly growing interest at other Russian automotive companies. "We are very pleased with the success of the Ford Sollers project, our first simulation project for our customers."

Using Plant Simulation, manufacturing, procurement and commissioning were completed on the buffer equipment for the BIW shop at Ford Sollers, with personnel and equipment productivity targets realized.

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