SIEMENS

BASF

Weaving a digital thread to streamline the production of crop protection agent

Product

Opcenter

Business challenges

Reliably produce and package fungicides

Improve production transparency

Maximize productivity

Keys to success

Use Opcenter for vertical process integration

Close digitalization gap between ERP and SCADA systems

Include quality control in digitalized production processes

Integrate handheld scanners to improve data acquisition

Results

Streamlined the production of crop protection agent using a digital thread

Reduced batch production time by 5 to 10 percent

Eliminated five days of manual paperwork per month

Secured timely fungicide supply

Promoted sustainable high-yield farming

Using Opcenter to reduce batch production time by 5 to 10 percent

Leading performance for growing success

Farming has always been complex with the unpredictability of the weather, control of pests and weeds, market price development and scarcity of natural resources. Today, growers worldwide depend on safe and reliable tools for controlling diseases. Highly efficient, innovative fungicides are key for sustainably managing fungal diseases while also ensuring good quality and yields.

As a leading company in the crop protection industry, BASF has a track record of being a reliable partner to farmers for more than 100 years. The BASF portfolio is comprised of seeds and specifically selected plant traits, chemical and biological crop protection, solutions for soil management, plant health, pest control and digital farming.

BASF is headquartered in Ludwigshafen, Germany, where it operates more than 200 of its global production sites, producing thousands of commercial products for different applications. Among them is

BASF is a global chemical industry player based in Ludwigshafen, Germany, where they produce Xemium, a high-performance active ingredient for fungicides that ensures consistently high yields for farmers.
All images unless stated otherwise: BASF SE

Xemium production runs 24 hours a day, 365 days per year and involves both continuous and batch processes as well as laboratory analyses for quality control and end-of-line packaging.

plant that runs 24/7. It involves continuous and batch processes, with batch production cycles spanning several days. At the end of the lines, the product is filled into big bags and is shipped to other production facilities for further processing.

The BASF team used a fully autonomous process to produce Xemium since the plant was commissioned in 2010. All parts of the plant, as well as upstream plants, are controlled using the SIMATIC® suite, including an installation of the SIMATIC PCS 7 process control system and the SIMATIC BATCH software package for efficient batch processes automation.

In-process quality control activities involve taking samples and performing analyses in an on-site laboratory. The team had installed the SIMATIC WinCC V7 supervisory control and data acquisition (SCADA) software to help them streamline quality control processes.
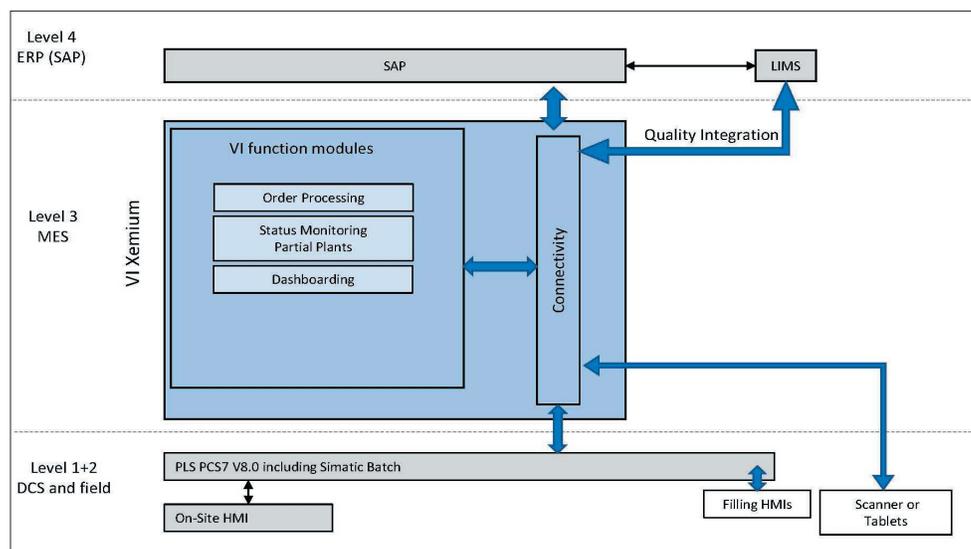
BASF uses enterprise resource planning (ERP) software to create process orders and control recipes for the crop protection agent production plant. Until recently, there was no connection between the

Xemium®, an active and environmentally safe fungicide combining a high intrinsic activity against a range of fungi and a unique mobility in the entire plant. This results in highly reliable crop protection for greater yields, helping growers combine profitability with environmental protection.

Information suspended worlds apart
BASF processes and packages Xemium and other related products in its production

> **"Vertical integration closed the digital gap separating our technical and business software systems."**
>
> Dr. Moritz Hofherr
> Automation Engineer
> BASF

Opcenter Execution Process acts as an information hub between the ERP software and the process automation system. It also communicates with the laboratory information management system and with handheld wireless devices for sampling, materials tracking and packaging.

systems. The laboratory SCADA system was similarly isolated from the surrounding software landscape.

This meant the team had to print and manually enter process orders and control recipes using the control system's human-machine interface (HMI). This process frequently involved conversion calculations using generic aids such as spreadsheet software and pocket calculators. Supervisors had to manually enter information on finished batches and quality reports in the ERP system. Like the packaging checklists, these reports were paper bound.

Closing the digital gap

"This 'bio-mechanical data transport' with its manual procedures was time-consuming and created bureaucratic extra work for highly qualified staff" says Maximilian Hierold, project operations manager for BASF. "It was also error-prone, meaning that it had a high potential for process deviations caused by individual operator workflows."

Delaying the entry of quality reports impeded the plant's ability to respond to process deviations. Regarding manageability, the plant produced all raw materials

using standard batches. There was also a lack of traceability of raw materials consumed in the batch processes. "As the packaged products were only picked up during day shifts on regular workdays, precise production planning well ahead of time was required to prevent the outbound warehouse from overflowing," says Dr. Moritz Hofherr, automation engineer at BASF.

This gave the BASF process automation experts the notion to increase production efficiency by introducing the vertical integration of the hitherto separated software systems as part of a corporation-wide digital transformation effort. In a preliminary study, they compared possible solution concepts centered around manufacturing execution system (MES) software as the missing link between SIMATIC BATCH and the ERP software. Based on these concepts, they invited tenders to propose new solutions.

The winning tender proposed using Opcenter™ software, a harmonized, holistic portfolio of manufacturing operations management (MOM) capabilities for advanced planning and scheduling (APS), manufacturing execution, quality management, manufacturing intelligence and

Handheld scanners with a custom graphical user interface support processes requiring manual data acquisition such as taking samples or recording expendables consumption.

> **" The Siemens experts involved in this collaborative project used their high level of competence to ensure its completion, meeting our expectations."**
>
> Maximilian Hierold
> Project Operations Manager
> BASF

performance, formulation, specification and laboratory management. Opcenter and SIMATIC are part of the Xcelerator portfolio, the comprehensive and integrated portfolio of software and services from Siemens Digital Industries Software. Using Opcenter Execution Process helped the team create a middleware layer to close the digital gap between existing systems.

End-to-end digitalization
Formerly known as SIMATIC IT Unified Architecture Process Industries, Opcenter Execution Process is Siemens' MES for packaged consumer goods, food and beverage and chemical industries. Using Opcenter allows companies to increase manufacturing efficiency, flexibility and deliver excellent quality, all based on a state-of-the-art platform and app approach.

Siemens helped coordinate a BASF project team to provide technical and process knowledge and to achieve best possible user acceptance. Siemens developed a comprehensive integrated solution that helped the team link operational

technologies (OT) with information technology (IT) to build a comprehensive digital twin of the production plant.

At the core of the production digitalization solution, using Opcenter Execution Process helped the team create an information hub that turns process orders it receives from the ERP software into control recipes it transfers to the process automation system. They also leveraged the software to send material or status acknowledgment messages to the ERP software.

Using Opcenter, they created an MES that autonomously creates and sends sampling requests to the laboratory information management system (LIMS) and feeds analysis results from the LIMS back to the batch processing system. Using handheld scanners with a custom graphical user interface (GUI) supports processes requiring manual data acquisition, such as taking samples or recording expendables consumption.

Using Opcenter Execution Process helped the team achieve digital coverage of the entire production process including

Solutions/Services

Opcenter Execution Process
siemens.com/opcenter

Customer's primary business

BASF is one of the world's largest chemical companies with around 111,000 employees in almost every country in the world. Its portfolio includes chemicals, materials, industrial solutions, surface technologies, nutrition and care and agricultural solutions. In 2021, BASF generated €78.6 billion in sales.
www.basf.com/global/en.html

Customer location

Ludwigshafen
Germany

At the end of the line, the product is poured into big bags for shipping to other production facilities for further processing. This process is aided by filling checklists using handheld scanners as input devices.

packaging at the end of the lines. Workers there use handheld scanners to process filling checklists. Based on these entries, the MES also triggers the shipping processes in the ERP system, including label printing for the containers.

"Vertical integration closed the digital gap separating our technical and business software systems," says Hofherr. "Using Opcenter Execution Process allowed us to weave a digital thread across the entire production process for this fungicide designed to promote sustainable high-yield farming."

By using Opcenter combined with measures such as recipe definition modifications, this solution yielded considerable benefits, including increased production efficiency. It eliminated all manual data entry, eliminating errors and delays. The resulting data consistency provides full production transparency and facilitates faster plant control reactions, improving

process stability and product quality. "Using end-to-end digitalization reduced the batch production time by 5 to 10 percent," Hierold says. "In addition, it relieved our production supervisors of five days per month of bureaucratic side activities."

Digitalization was also key to the successful system implementation during the COVID-19 pandemic. This required resorting to remote methods for all software installation work, tests and training and commissioning. "The Siemens experts involved in this collaborative project used their high level of competence to ensure its completion, meeting our expectations," says Hierold. "Following this success, similar projects using Opcenter for vertical integration are underway at BASF."

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