

# Bayer AG—Vendor Managed Inventory

## Opto 22 and ATplan Collaborate to Ensure Availability of Bayer Materials Across Europe

### Introduction

Bayer is a diversified, research-based international chemical and health care group active in life sciences, polymers, and agriculture. Though perhaps best known for its over-the-counter pain-relief products, Bayer chemicals are a vital component in a number of branded products produced by many other manufacturers all over the world.

Bayer has five production sites in Germany, the largest being located in Leverkusen on the Rhine River between the cities of Cologne and Düsseldorf. Spread over three and a half kilometers and with nearly 600 buildings, the Leverkusen site is one of the world's largest and most diversified production centers for organic and inorganic chemicals. The site has over 24,000 employees and houses both central research and technical service laboratories along with production facilities for manufacturing and storing water, oxygen, and other chemicals and gases needed to produce a wide variety of pharmaceutical products.

### The Challenges

Several years ago, in efforts to deliver more value in supplying materials from the Leverkusen facilities to locations all over Germany, Bayer sought to establish an online Vendor Managed Inventory (VMI) system. Among other things, it was determined that this system would provide a method for Bayer to remotely administer and manage their customers' supply of chemicals.

The VMI system needed to include a monitoring and management system for customers' remotely located storage tanks (outstations) along with a Web-based method for inventory management through the various stages of the supply chain. The data needed to be imported into an SAP supply chain management system to allow for automated ordering. Also, to facilitate enterprise decision-making, customized presentations of data needed to be made available

to select individuals for evaluation. The implementation needed to be quick, seamless, scalable and transparent. Lastly, future-oriented technologies and open interfaces needed to be used so that the new system could be deployed to meet both supplier and customer needs in the shortest possible time. An open architecture would also benefit all selected system integrators, suppliers, and other outside vendors in the setup, operation, and management of the new system.

### Tank Level Monitoring and Management

The first component of the project required measuring the fill level of each tank and capturing and transferring all related data to a central location. The tank levels needed to be monitored across a wide range of capacities and the measured values collected at the individual outstations. The gathered data then needed to be transmitted at regular intervals to a central station, preferably via a standard telephone modem. Continuous availability of chemicals was especially critical due to the fact that many of Bayer's customers operate 24-hour-a-day manufacturing facilities.



*Storage Tanks (Outstations)*

### Inventory Management

The second component of the project, inventory management, required the prompt update of inventory changes in Bayer's SAP supply chain management system. Bayer also needed to have inventory-related information made available to each of its customers and the data needed to be updated regularly and expeditiously.

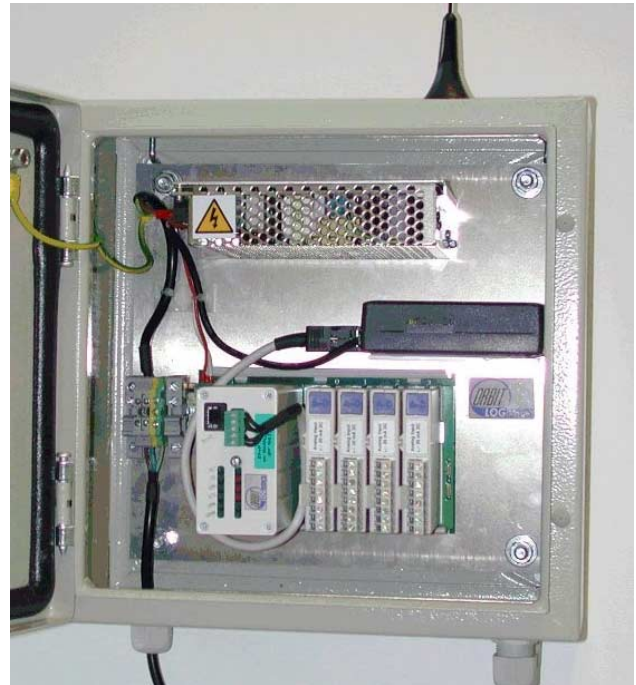
### The Integrator

Bayer selected the German consulting firm ATplan as the system designer and integrator. Founded in 1992 with offices in Germany and the US, ATplan has extensive experience planning, deploying, and maintaining PLC systems for several companies including Bayer. It was this established and successful relationship, combined with the fact that ATplan was also an accomplished e-commerce solutions provider, that the firm uniquely qualified to meet all of the specific requirements of the Bayer application. To fulfill the project requirements with an open, flexible, and scalable system, ATplan quickly deployed its comprehensive ORBIT-Logistics VMI solution.

### The Solution

ATplan began by dividing the project into multiple, well-defined processes: data acquisition, data transmission, data pre-processing and storage, and data presentation. ATplan determined that identifying and segmenting Bayer's needs in this way would also help decrease dependence on proprietary interfaces and technologies from specific manufacturers and vendors. ATplan carefully designed the system architecture and chose the system components (and their communication interfaces) to fulfill each of these clearly outlined project phases.

To perform the tank monitoring and subsequent data acquisition and data transmission functions, ATplan chose Opto 22's SNAP Ethernet I/O system. The SNAP system utilizes sensor and actuator technology to attach to a wide variety of factory equipment and



*Opto 22 Panel-Mounted SNAP System*

systems and other assets, including Bayer's remote storage tanks. The system then connects these devices to the enterprise's IT network via an Ethernet network, wireless LAN, or, in Bayer's case, standard and wireless modems and the Internet. The SNAP hardware provides the most flexible interface for enterprise-wide data collection due to its modularity and because it can handle a large combination of sensors and actuators simultaneously. ATplan therefore deployed Opto 22 SNAP systems for the Bayer facilities. Each system consists of a 4-module rack and a processor capable of handling as many as 16 sensors or actuators. Once installed, the SNAP systems allowed the tanks to be remotely monitored and the desired business data could be aggregated and delivered to enterprise applications, including Bayer's SAP supply chain management system.

### Data Acquisition

The tank levels are monitored and measured primarily by means of radar, ultrasound, and pressure differential sensors connected to Opto 22 SNAP analog input modules. The SNAP system is configured to express the raw sensor data as either gallons or liters.

The system is also configured to send SNMP-based alarms to warn of certain events occurring at the outstations such as power failures, critically low tank levels, extreme environmental temperatures, and transducer malfunctions.

Bayer is also utilizing barcode readers connected to Opto 22 serial modules to track tank deliveries. As tanks are being replenished, delivery personnel scan barcodes indicating their employee identification number along with the type and quantity of each chemical or gas they are delivering to the tanks. The SNAP system then sends this data to the supply chain management system.

### Data Transmission

Once the tanks could be effectively monitored, the measured data needed to be transmitted. This takes place in a variety of ways. One method involves using a standard modem to call into the SNAP system over a PPP-based dial-up connection. This is Bayer's preferred method due to security concerns and the fact that a point-to-point link such as this enables callbacks (that is, the SNAP systems can also call out using PPP and send data at regular intervals.) In areas where landlines are not available, a GSM wireless modem is used and, in some instances, a direct connection is made via a router to the Internet.

From the sensor to the database, all information is delivered in an XML format. Within the remote SNAP system, tank sensor data is collected and aggregated into an XML file and transmitted via the communication system to an Oracle database located at ATplan. This raw data is then checked for authenticity and validity and transformed into an XML file adhering to a schema defined by the Chemical Industry Data Exchange (CIDX) standard. Finally, the CIDX-compatible XML file is transmitted to Bayer's SAP supply chain management

system where the data is converted into business intelligence relative to the status and availability of products throughout the Bayer supply chain.

### Data Pre-processing/Storage

All measured data pre-processing and storage as well as system modifications (e.g., configuring to receive data from a newly connected storage tank) are performed through the centralized Oracle database at ATplan where all captured data is time stamped and filed.

### Data Presentation

All tank monitoring and inventory data is presented and distributed via a Web browser through the ORBIT-Logistics portal. Graphical representations of Bayer's tanks and related data are available on a secure, password-protected Web site hosted by ATplan. With proper authorization, Bayer personnel and their customers can access, view, and modify the information. In this regard, Bayer's expectations were pleasantly exceeded. "The Bayer project team made it very clear that they needed to make the same data available to personnel at all levels of the organization," says Joachim Klasen, Project Manager for ATplan. "All this time, operations people on the manufacturing floor would have access to certain data and it might take as much as a day to get that information to upper management. The new access to data puts everyone on the same page and helps Bayer a great deal in their decision-making processes."

Product	Bayferox 650 0499274	B'PREN 213 00027464	D'DUR-PC 04476883	D'DUR-PC 04476883	Lichtblau 100 00247553
VMI group	Ferrex	B'PREN	DDUR-PC	DDUR-PC	Lichtblau
Location	Malland	Malland	Barcelona	Barcelona	Malland
Supplier	Bayer	Bayer	Bayer	Bayer	Bayer

Capacity	6000t	100t	1500t	800t	150 (100t)
Current quantity	656t	54.9t	459t	199t	80.0t
Replenishment plan point	2000t	50t	309t	209t	20t
Replenishment ship point	1000t	40t	209t	159t	15t
Minimum inventory	500t	5t	59t	59t	2t
Status	<a href="#">Details</a>	<a href="#">Details</a>	<a href="#">Details</a>	<a href="#">Details</a>	<a href="#">Details</a>
	<a href="#">Diagram</a>	<a href="#">Diagram</a>	<a href="#">Diagram</a>	<a href="#">Diagram</a>	<a href="#">Diagram</a>
	<a href="#">Replenishment</a>	<a href="#">Replenishment</a>	<a href="#">Replenishment</a>	<a href="#">Replenishment</a>	<a href="#">Replenishment</a>
	<a href="#">Forecast</a>	<a href="#">Forecast</a>	<a href="#">Forecast</a>	<a href="#">Forecast</a>	<a href="#">Forecast</a>

## The Results

Currently, ATplan and ORBIT-Logistics are hosting all of the servers connecting the Opto 22 SNAP systems to Bayer's supply chain management system and has succeeded in providing Bayer with a comprehensive VMI system that originates with the customer's requirements and proactively fulfills all of their inventory and information needs. The new system offers a consistent information platform available to individuals at every level of the supply chain including Bayer personnel, their customers, and partners.

"Bayer was basically just looking for a Web-based way to monitor their tanks and track inventory," says Klasen. "The Opto 22 technology lets them view all of their connected assets, plus they have the ability to capture data in real time and adjust their production processes appropriately. All in all, they got a lot more than they bargained for and they're very happy about it."

The availability of real-time data also helps reduce costs and optimize inventories by allowing Bayer to identify and deliver needed chemicals to its customers and better coordinate their supply strategies, schedules, and processes. For example, the delivery data the SNAP system is now gathering using the barcode readers saves Bayer a great deal of time. Previously, all of this information was being recorded by hand and entered into the supply chain management system at a later time. Moreover, getting this information into SAP immediately allows Bayer's accounts receivable department to access

up-to-the-minute information on tank deliveries and replenishment so they can begin billing right away. ATplan refers to this particular process as the "self-controlling supply chain management loop", a major part of the ORBIT-Logistics VMI solution. Bayer is also realizing significant monetary savings due to the lower warehouse capacity required now that the delivery reporting process has been streamlined in this way.

## What's Next

Now in place for over two years, Bayer's VMI project has been so successful that the company has introduced identical systems at facilities all over the world, with ATplan integrating Opto 22 systems for Bayer subsidiaries in the United Kingdom, Italy, and Spain. Additionally, as in so many other monitoring and data acquisition applications, Bayer is considering adding a number of control functions. Though currently focused on tank monitoring and data delivery, the SNAP system will soon exercise more control and perform remote functions such as opening a drain if indications show that a tank is about to overflow.

Ultimately, ATplan is looking towards bringing their VMI solution to other chemical companies throughout Europe, Asia, and North America. They're well on their way as ATplan already has projects up and running for companies in Spain, Finland, and the United States.

For more information on AT-Plan, go to <http://www.atplan.de/>

For more information on Opto 22, go to [www.opto22.com](http://www.opto22.com)

## About Opto 22

Founded in 1974, Opto 22 manufactures and develops hardware and software products, and offers service and support to automation end users, OEMs, and information technology and operations personnel, for applications in industrial automation, remote monitoring, and enterprise data acquisition. Utilizing standard, commercially available Internet, network, and computer technologies, our input/output and control system hardware and software products allow

you to monitor, control, and acquire data from any mechanical, electrical, or electronic devices that are key to your business. With over 65 million points deployed worldwide, Opto 22 has a solid reputation for quality and reliability. Opto 22 products are sold through a worldwide network of distributors, partners, and integrators. For more information, contact Opto 22 headquarters at 800-321-OPTO or visit our Web site at [www.opto22.com](http://www.opto22.com).