

DIGITAL

A digital future – today

Hubei Sanning Chemical Industry Co., Ltd. – Hubei, China

Building a state-of-the-art smart plant with
EcoStruxure™ for Oil, Gas, & Petrochemicals

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Life Is On

Schneider
Electric



EcoStruxure Triconex Safety Systems are part of the Edge Control portfolio of the Schneider Electric IoT-enabled architecture: **EcoStruxure for Oil, Gas & Petrochemicals**. Recognized as the market's most dependable safety systems, our high integrity safety solutions drive measurable operation profitability improvements – safely.

Building a plant for the ages

Along the shores of the Yangtze River, just south of the famed Three Gorges dam, sits the Hubei Sanning Chemical Co. (Sanning Chemical), a large-scale chemical enterprise working in the coal, phosphorus, and fine chemical industries. Founded in 1969 as a fertilizer plant, it has transformed over the past 50 years into the leading national brand in China's chemical industry.

The company's total assets amount to nearly 30 billion yuan (2.6 billion euros) and it produces hundreds of thousands of tons a year of chemicals such as ammonia, nitrogen, phosphate, potash and compound fertilizer, sulfuric acid, phosphoric acid, nitric acid and hydrochloric acid, caprolactam, hydrogen peroxide and cyclohexanone. It operates six dedicated hazardous chemical terminals for their distribution, dedicated fleets for the transportation of hazardous chemicals, and a large storage and transportation center for hazardous chemicals.

The chemical industry is the upstream link for the entire manufacturing industry and – by extension – the national economy, directly impacting the success and prosperity of downstream industries that touch everyone like food, housing, clothing, and transportation. As such, Sanning is committed to building a “plant for the ages” equipped with the latest digital technologies to achieve smart, green, safe, and sustainable development.

In the past, chemical companies were notorious for high emissions and energy consumption, but Sanning Chemical works in a closed-loop circular economy, from resources to products to waste and, finally, to renewable resources.

Today, chemical companies face three primary but conflicting challenges:

1. The complexity of production equipment and the industry's requirements for the highest levels of safety and stability
2. Differentiation amidst a proliferation of products and increasingly fierce market competition
3. The industry's inherently high pollution and energy consumption in the face of the desire for green and sustainable development

Goal

A large-scale digital transformation to ensure safe and reliable production, environmental compliance, and lower operating costs through greater efficiencies.

Story

China's leading chemical producer, Sanning Chemical, embarked on a comprehensive upgrade of their huge ethylene glycol facility to build a “plant for the ages” equipped with digital technology to achieve smart, safe, and sustainable operations.

Solution

A full EcoStruxure for Oil, Gas & Petrochemical solution that integrates power distribution and process automation, including the EcoStruxure Triconex Safety Instrumented System and leading-edge industrial software from AVEVA.

Results

- 25-30% improvement in workforce efficiency
- 5% reduction in energy consumption
- Faster time-to-operation with remote operator training using digital simulation
- Safe & stable operations
- Improved operational and maintenance efficiencies and power supply continuity
- Future-proof through end-to-end digitization

A partner for process automation, electrical distribution, and energy management

Schneider Electric offers complete process automation and electrical distribution solutions for the Oil, Gas and Petrochemical industries and was Sanning Chemical's main automation and electrical partner for its latest 600,000-ton/year coal-to-ethylene glycol project. Based on the EcoStruxure architecture, Schneider delivered a range of safety and digital solutions, including the Triconex Safety Instrumented Systems (gas detection and compressor control), Altivar drives (ATV1200, ATV930), medium and low voltage smart power distribution systems, PIX medium voltage distribution cabinets, MasterPact MTZ air circuit breakers, ComPact NSX molded case circuit breakers, TeSys D contactors, and A9 series miniature circuit breakers.

Schneider's EcoStruxure solutions also integrate seamlessly with leading-edge industrial software from AVEVA, including AVEVA Asset Information Management and AVEVA Operator Training Simulator (OTS) system which helped Sanning Chemical build its digital plant and achieve its goal of safe production. The comprehensive upgrade of its production management, operations, and maintenance has paved the way for a complete digital transformation.

Power + Process = An all-in-one system

Oftentimes, companies select automation systems and electrical equipment from different suppliers, resulting in increased expenditures and longer project cycles. As Sanning Chemical's main automation and electrical partner for its ethylene glycol plant, however, Schneider Electric was able to integrate both the process automation and power distribution systems, helping improve Sanning Chemical's overall operational and maintenance efficiency.

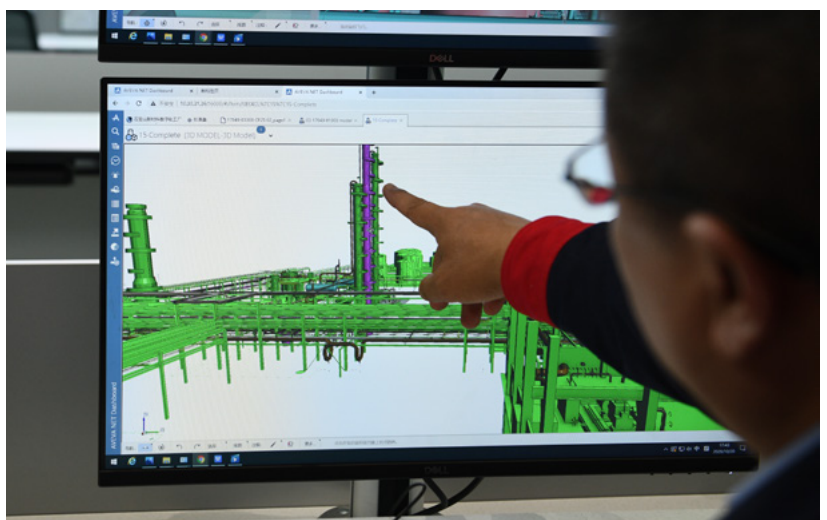
For power distribution, medium and low voltage distribution systems such as the PIX MV smart panel and the MasterPact MTZ air circuit breaker help Sanning Chemical improve power supply continuity and reliability.



The convergence of power distribution and process automation systems can generate significant benefits throughout the lifecycle of a plant. In the project design stage, working with a single vendor simplified communication and eliminated the risk of any incompatibility issues, which also reduced costs. In the project construction and commissioning stages, the integrated system reduced any data loss during transmission, ensuring data accuracy and security while deploying the equipment. Finally, working with an integrated system in the operational and maintenance phases makes it easier for operators in the central control room to understand the power distribution and control systems simultaneously, with real-time information that improves communication efficiency amongst the workforce and reduces labor requirements.

+25-30%

workforce efficiency

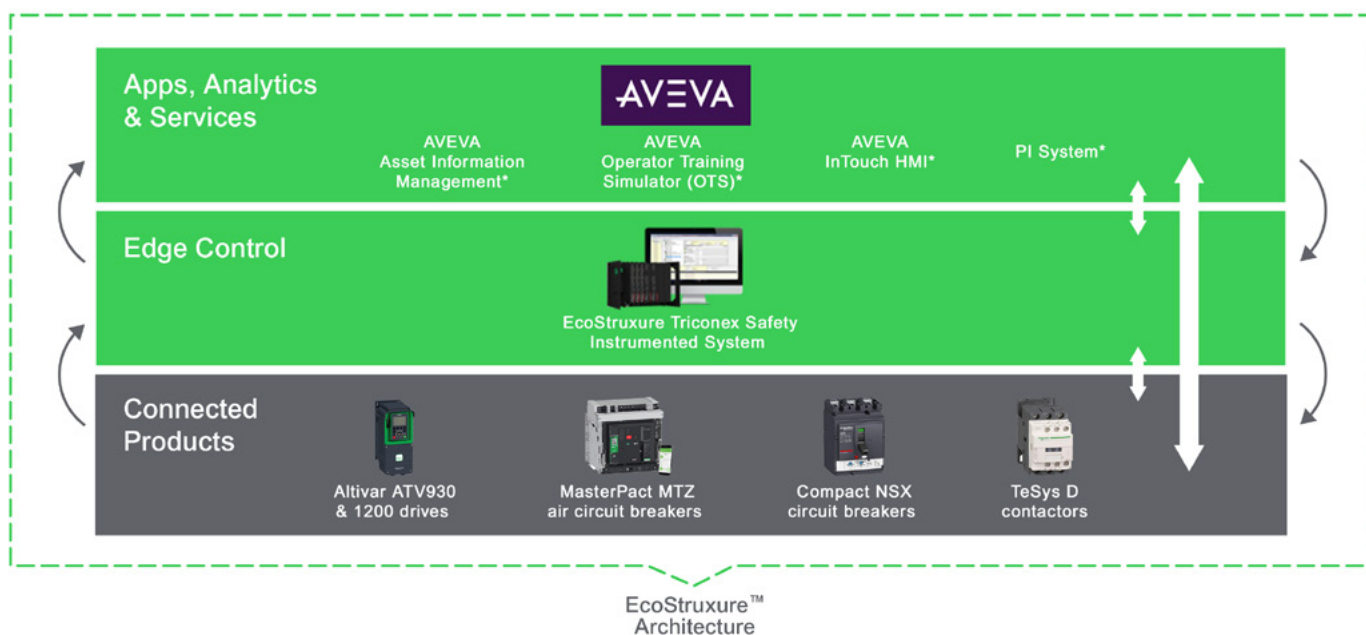


Safety first and always

Chemical production can be a flammable, explosive, toxic, corrosive, high temperature, high pressure operation, with complex production processes, and prone to accidents, so safe and reliable production is always a top priority. To address the critical safety of production and personnel, Sanning Chemical relies on the EcoStruxure Triconex Safety Instrumented System (with gas detection system and compressor control system) which includes network, system, and management security. This three-tiered defense system ensures precise control and safe and stable operation of the unit. Recognized as the market's most dependable safety systems, our high-integrity Triconex safety solution delivers the greatest levels of protection for Sanning Chemical's people and assets, and ensures continuous, safe operation and maximum plant availability with lower operational risk.



EcoStruxure™ for Oil, Gas & Petrochemicals



*The Schneider Electric industrial software business and AVEVA have merged to trade as AVEVA Group plc, a UK listed company. The Schneider Electric and Life is On trademarks are owned by Schneider Electric and are being licensed to AVEVA by Schneider Electric.

Bolstering the “soft power” of chemical plants

If high-quality equipment is the “hard power” that ensures the safe and stable operation of a chemical plant, then highly trained expert personnel are the “soft power” that ensures its efficient operation and management. Today, as chemical plants become increasingly automated and processing principles become increasingly complex, engineers and operators face multiplying challenges.

A smart factory with advanced technologies such as Sanning Chemical’s massive ethylene glycol plant also demands more from its personnel. An operator’s process knowledge, experience, and skill levels are prerequisites for ensuring a smooth start and safe production. Consequently, Sanning Chemical’s management has always prioritized comprehensive staff training.

Enter AVEVA Operator Training Simulation (OTS). This system simulates the installations onsite, controlling the situation and training operators in a virtual environment, offline or online. Specifically, before the project goes into production, an operator can understand and master the new environment using AVEVA OTS. Then, once the upgrade is operational, OTS can also model the causes of a failure. Its simulation accuracy is up to 99.9%. And finally, with the processes of the entire plant in the cloud, Sanning Chemical can also conduct training and operations remotely, a first for China’s coal chemical industry.

“AVEVA OTS has helped us optimize process control, reduce errors, meet our customized training and assessment requirements, and ultimately, far exceeds our expectations,” says Yang Wenhua, head of Sanning Chemical’s Smart Plant program.

Safe, future-proofed operations with end-to-end digitization

From the outset, Sanning Chemical’s 600,000 ton-a-year ethylene glycol project has been deeply rooted in digitization, starting with its impressive central control room. The construction of its smart plant has been a global project involving information technology (IT) and operational technology (OT). To this end, Sanning Chemical

established its Smart Plant program in December, 2016, with the goal of integrating data from the production and business levels to open up production, supply chain, and marketing, and lay the foundation for smart manufacturing and digitization. Looking back today, this was a very forward-thinking move for the industry as a whole.

The digital delivery was accomplished with AVEVA Asset Information Management, which brings together multiple sources of engineering and operations information in the digital twin to enable users across the business to securely access, validate, and collaborate on the asset data, delivering fast, effective navigation of asset information. Synchronization with the physical plant – including data integration in the design, procurement, and construction stages of the air separation, coal gasification, and ethylene glycol production components – provided clear benefits. During the design and construction phases, it enabled engineering-related data to be continuously collected so that consistent data could be shared amongst the different project

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— Yang Wenhua
Smart Plant Program Head
Hubei Sanning
Chemical Industry



participants to facilitate collaboration. Staff in the design office and the construction site could review two-dimensional and three-dimensional drawings using a browser. The progress of the entire construction and procurement processes could then be simulated and visualized, greatly improving engineering efficiency.

“Digital delivery allows us to unify all design standards at the design stage. We also get three-dimensional visualization of the construction, management, risk, and other processes, which helps us manage asset data in a consistent manner,” adds Wenhua.

During the plant’s operational life, a unified digital delivery platform provides structured data for systems such as ERP, enterprise asset management etc. so maintenance and production departments can quickly and accurately query engineering data for use in new, modified, or expanded projects. At the same time, static/dynamic data is integrated into the virtual plant, providing an accurate database for operational and maintenance decision-making.

AVEVA Operator Training Simulator enabled Sanning Chemical to get up and running faster as operators could train remotely on

the system, even during lockdown, using digital twins. It helps optimize process control and cuts the misoperation rate, improving workforce efficiency by 25-30%.

Finally, the real-time database built on PI System opened up the design stage to the construction and operational stages, seamlessly connecting the production control system and information management system and greatly improving the real-time data to further support managers’ efficient decision-making.

The fully integrated process automation and power distribution systems improve overall operation and maintenance efficiency and power supply continuity, reducing Sanning Chemical’s energy consumption by 5%.

Building a smart factory and embarking on a digital transformation journey was an important decision for Sanning Chemical to help it realize its vision of a “plant for the ages.” In the future, it hopes to contribute further to the development and expansion of China’s chemicals industry, and Schneider Electric will continue to support its ambition with smart, green, and safe solutions.



EcoStruxure™

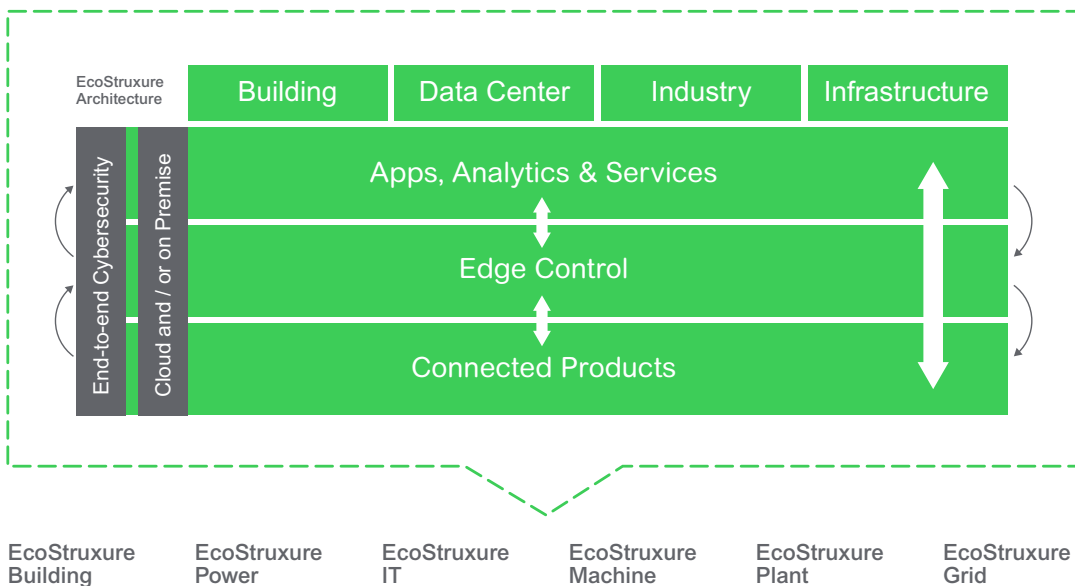
Innovation At Every Level

IoT-enabled solutions that drive operational and energy efficiency

EcoStruxure is our open, interoperable, IoT-enabled system architecture and platform. EcoStruxure delivers enhanced value around safety, reliability, efficiency, sustainability, and connectivity for our customers. EcoStruxure leverages advancements in IoT, mobility, sensing, cloud, analytics, and cybersecurity to deliver Innovation at Every Level.

This includes Connected Products, Edge Control, and Apps, Analytics & Services which are supported by Customer Lifecycle Software. EcoStruxure has been deployed in almost 500,000 sites with the support of 20,000+ developers, 650,000 service providers and partners, 3,000 utilities and connects over 2 million assets under management.

One EcoStruxure architecture, serving 4 End Markets with 6 Domains of Expertise



Connected Products

The Internet of Things starts with the best things. Our IoT-enabled best-in-class connected products include breakers, drives, UPSs, relays, sensors, and more. Devices with embedded intelligence drive better decision-making throughout operations.

Edge Control

Mission-critical scenarios can be unpredictable, so control of devices at the edge of the IoT network is a must. This essential capability provides real-time solutions that enable local control at the edge, protecting safety and uptime.

Apps, Analytics & Services

Interoperability is imperative to supporting the diverse hardware and systems in building, data center, industry, and grid environments. EcoStruxure enables a breadth of agnostic Applications, Analytics, & Services for seamless enterprise integration.

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