

Challenges and Opportunities in Chemical Manufacturing

Chemical manufacturers are facing many challenges post Covid-19, including the sourcing of raw materials, fluctuations in pricing, and government regulations regarding disposal and cost of production. Environmental, Social and Governance policies are increasingly important for investors and customers seeking long-term value and alignment with sustainability and climate-related objectives.

Amid these challenges, chemical manufacturers require tools that will help control and maximise assets, minimise operating costs, and monitor the impact of decisions on production, inventory, and distribution.

Environment, social governance and sustainability

Environmental and social governance (ESG) is a key focus for the chemical industry as companies are scrutinised on their operations' sustainability and increasingly stringent regulatory requirements. ESG performance is anticipated to receive the same high benchmarking treatment as cost and other productivity measures.

Corporate, domestic and international initiatives aim to eliminate net greenhouse gas emissions by 2050, ensuring the Paris Agreement and COP26 commitments are met.

Plans to reduce carbon emissions are more complicated in the chemical industry, where sustainability needs to extend throughout the supply chain. This includes the ESG and sustainability principles of all chemical plant suppliers and partners as well as downstream partners.

This strong trend places particularly high demands on the chemical industry, which is responsible for most of the world's emissions. One of the most important ways chemical companies are improving their sustainability profile is by developing innovative new technologies, including research and development, biotechnology, artificial intelligence (AI), and automation.

Technological developments

Every section of the chemical industry exhibits the constant adoption of technical advancements, generating opportunities and threats. The increased requirement for process efficiency is driven by the introduction of technology like IoT (Internet of Things) sensors for both manufacturing processes and end-product performance. Blockchain technology is also becoming more widely used to support product traceability and supply chain transparency concerning the timely delivery of chemicals to end markets.

The most untapped resource in our modern world is data. The issue is not a lack of raw data; rather, there is a significant gap between the availability of raw data and the people, systems, and resources needed to transform it into insights that can lead to data-driven operational certainty.

Production Planning

Manufacturing chemicals can be a complex process with many steps, and chemical suppliers must plan production carefully to meet customer demand. Production facilities need to know what chemicals they will need to produce a product, what reactants and solvents will be used, and where those products are located in the supply chain.

Chemical producers use information technology (IT) systems like enterprise resource planning (ERP) to manage all the complexity involved in manufacturing. However, these systems are unable to keep up with the rapid changes in the chemical industry without enhancements to AI.

So how can Yokogawa and AI help within the Chemical Industry?

In March 2022, Yokogawa and JSR announced the successful completion of a field test in which AI was used to run a chemical plant autonomously for 35 days in the world's first.

This trial used next-generation control technology that considered quality, yield, energy saving and sudden disturbances. The test confirmed that reinforcement learning AI can be safely applied in a plant and demonstrated that this technology could control operations beyond the capabilities of existing control methods (PID control/APC).

The AI trial also maximised the waste heat for use as a heat source, thereby saving energy, and all products met rigorous standards and were subsequently shipped. In addition, off-spec products were eliminated, which helped to reduce fuel, labour and other costs.

Yokogawa welcomes customers who are interested in these initiatives globally. The company aims to swiftly provide products and solutions that lead to the realisation of industrial autonomy. Contact Yokogawa to discover more tailor-made solutions for your plant. (uk.marketing@uk.yokogawa.com)

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