Chemicals

Background

Chemical manufacturers are under increasing pressure to do more with less; more than ever there is a need to exploit every opportunity to maximise asset productivity and to ensure that associated processes are as efficient as possible.

Our process control, optimisation and analytics solutions ensure you get the most from your resources.

Spiro MPC

Spiro MPC is a multivariable model predictive control application. The application comes embedded on a small footprint edge device, designed to connect to any control system easily. When embedded with Spiro MPC, the edge device is able to automate control of connected assets and can maintain processes at their optimal operating point.

Using Spiro MPC, chemical manufacturers can significantly reduce the standard deviation of important control variables and increase ease of operation.

When relying on conventional controls, human operators have to be highly focused in order to maintain the reliable, consistent and stable running of processes; they must manage in real-time a highly complex, highly correlated, dynamic environment. However, given the complexity, there are limits to what a human operator can process in real-time. Using highly efficient state space control algorithms which achieve millisecond execution frequency, Spiro MPC can analyse multiple variable scenarios and make real-time adjustments to optimise control combinations on a continuous basis. As a result of this careful and constant fine tuning, the variance of key variables are reduced and process capability is increased.

Increased stability of the process, in turn, allows for increased production, improved product quality, and reduced operating costs.

Spiro MPC & plant-wide optimisation

In continuous process industries, like the chemicals industry, there is a need for a control strategy that addresses the challenge of optimising an entire integrated manufacturing facility as a complete holistic solution rather than optimising individual sub-systems. For example, an ethylene plant can

increase operating capacity by 2-4% through plant-wide optimisation compared to localised unit optimisation, with a financial benefit of £ 2-6 million per year (Reference: audited benefits of projects implemented by Spiro Control team e.g. TOTAL's cracker in Gonfreville, France). The Spiro MPC solution achieves plant-wide optimisation through cooperative distributed control. Each unit operation has a separate controller, preserving simplicity, but each controller is aware of subsystem interactions so that all controllers in the network cooperate to ensure that a plant-wide objective is achieved.

Estimated benefits from plant-wide optimisation

Ethylene	2-4% increase in production
Aromatics	3-5% increase in production / 4-6% reduction in specific hydrogen consumption
Ammonia	2-4% increase in production / 2-5% less energy/ton
Polyolefins	2-5% increase in production

"A chemical plant with centralised steam utility supplying reboilers, evaporators and turbines can reduce specific energy consumption by ~10% by optimising the whole utility network (G Shinskey), depending on the size of the plant this can have a benefit of £ 0.1-1.0 million per year."

Spiro Analytics

Spiro Control offers a range of analytics applications that come ready installed on a small footprint edge device designed to connect to any control system easily and capture real-time plant data. Our data analytics applications can be used to analyse process performance, diagnose faults and to infer hidden properties without the need for expensive on-line analysers.

Massive amounts of data are generated at each step of the chemicals production process, but all too often are not well analysed or made visible enough for useful decision support. The digital transformation of the chemicals industry only serves to amplify this problem as the volume of data being created is increasing exponentially.

Part of the problem is that traditional approaches to analytics have built-in delays. For example, data may be stored in a data historian or data warehouse for days, weeks, or months before being analysed (if ever). Our solution is based on processing, analysing and responding to data right where it originates - at the edge of the network. Edge analytics allows data to be analysed in real time, immediately after the data are generated. Consequently, any issues in the production process can be identified quickly, alerts generated, and corrective action taken.

Because of the way our solution is configured it means that data applications can be easily used and customised by control and process engineers at site, not just data scientists and software specialists.