More performance and safety for the chemical industry

Decisive factors driving today’s chemical industry include more efficient processes to allow the faster commissioning of plants, high productivity, availability and security over long plant life cycles and also flexible production management. Siemens has been not only an experienced but also an innovative partner supporting the petrochemical, base chemicals, specialty and fine chemicals industries for more than a century. Today, the product portfolio of this seasoned industrial supplier encompasses products, solutions and services along the entire value chain, ranging from automation systems through process instrumentation and analytics, drive technology and industrial controls to systems for energy management. With its comprehensive offering geared towards integrated software, tools and components, Siemens aims to enhance the productivity, efficiency and flexibility of its customers over the entire plant and product life cycle. The result: Reduced total cost of ownership (TCO) and production plants which achieve the pinnacle of operational excellence. By pursuing a continuous program of development and maintaining a close dialog with its thousands of customers in the chemical industry, Siemens continues to secure its position as pivotal technology partner to the industry.

“Our job is to support chemical corporations in achieving more effective, lower cost, more sustainable operation by pointing them towards integrated Main Automation Vendor (MAV) and lifecycle management concepts”, explains Miguel-Angel Fernandez, Head of Vertical Chemicals, Siemens AG. “Right from the planning phase, we take into account measures which have relevance for commissioning, operation and possible future modernization. This creates investment security and also reduces the total cost of ownership.”

The Siemens chemical industry portfolio encompasses a whole raft of industry-specific products and solutions, including process control, batch and MES/MOM
systems as well as engineering solutions for the entire plant and product life cycle. Added to these are analyzers and controllers, process analytics as well as energy and drive technology. Many components are also designed to withstand extreme environments. But the Siemens portfolio is not restricted to components, software solutions and tools for engineering. Reporting and operation intelligence are also part of the portfolio. Just as much a part of the offering are the worldwide availability of industry experts and technical services, a comprehensive service portfolio as well as special life cycle maintenance contracts and consultancy services in fields such as industrial safety or energy management.

**Improved process management and shorter time to market**

Because high plant availability and optimum process yield take top priority for the chemical industry, the process control system plays an instrumental role as the pivotal point of control and monitoring. The Simatic PCS 7 process control system from Siemens is already used by more than 10,000 customers worldwide, making it one of the most widely established systems in the marketplace. The system’s open system architecture, ease of use and specific supplementary functions make the Siemens solution a perfectly tailored system for the chemical industry which can be used both in petrochemical and fine chemical operations, in laboratory applications as well as in pilot or full-scale plants. Using tools such as Advanced Process Control (APC), the process control system supports consistent process management and even permits changes to be implemented during running production. Specific requirements and fields of application can be addressed by customized add-ons, such as Simatic Batch for the automation of complex batch processes in specialty and fine chemical production. This facility allows chemical manufacturers to enhance the flexibility of their production and adapt at short notice to changing market conditions. Other Simatic-PCS 7 add-ons include Advanced Process Functions (APF) for simple batch processes, which allows mixing operations to be flexibly and reliably controlled. Simatic PCS 7 can be used as the basis for simple automation of test laboratories. By enabling test results which are reproducible and therefore available for use in production, PCS 7 Lab helps reduce time to market. The system is supplemented by a Laboratory Information and Management System (LIMS), which is capable of capturing and structuring large volumes of data.
**Integrated engineering**

Trouble-free operation begins right from the plant planning stage. The Comos engineering software offers chemical manufacturers a faster, more cost-effective way to plan and commission their production facilities. Integrated data management makes for a new, integrated approach to plant engineering projects spanning their entire life cycle. In line with the Totally Integrated Automation (TIA) concept, the current Comos Version offers an interface to the Simatic PCS 7 process control system for bidirectional data exchange and is naturally also open for integration into other control systems. Comos makes a decisive contribution towards greater parallelization of sequential planning stages, resulting in a shorter time to production.

Comos and PCS 7 form the foundation for vertical as well as horizontal integration. As a global data center, Comos provides the assurance that data can be consistently maintained over the entire life cycle of a plant comparable to a virtual twin. Creating the link between the digital and real worlds is pivotal to the Industrie 4.0 vision, and is a key contributor towards ensuring a secure future. “Integrated Engineering” and “Integrated Operation” concepts to improve efficiency, flexibility, security, availability and quality are made possible by digitalization.

**Safety under control**

In the production of chemicals, top priority is attached to the protection of personnel, operating machinery and the environment without compromising the production process. Chemical producers will find plenty of solutions on offer from Siemens to ensure process reliability and minimize risk. Alongside automation and drive components designed to ensure safety, it also encompasses risk analyses, industrial IT security concepts and Operating Training Systems. (OTS).

Pivotal elements here are failsafe components, safety-oriented I/O modules and the process control system PCS 7. These allow the construction of an integrated safety system (with safety matrix) as well as redundant solutions. Also integrated is a wide array of safety applications designed to facilitate trouble-free operation. The integrated alarm management functionality, for instance, prioritizes all incoming alarm messages and enables personnel to achieve a targeted, rapid response to incidents. In running operation, partial stroke tests check that emergency shutdown valves are in perfect working order. The automation software can be virtually tested.
in advance using the simulation platform Simit, minimizing the potential risks inherent in real commissioning on site.

Right from the plant commissioning stage, safe operation and asset protection can be planned under the aspect of augmented safety. Safe operation provides support in maintaining plant components within defined limits, visualizing plant status and suggesting actions to enhance controller performance – and all before the need to implement the comprehensive safety management requirements set out by the Functional Safety standard with Safety Instrumented Functions. It goes without saying that we support the entire safety life cycle as set out by IEC 61511.

The Siemens drive technology, process analytics and instrumentation portfolio also features integrated safety functions, including intrinsic safety, up-to-date approvals and error-tolerant communication (ring redundancy) down to the field level as well as explosion-proof motors for use in environments at risk from dust or gas explosion. Functional safety up to SIL 3 is provided by Simocode pro, for instance, which ensures the safety cut-out of motors by means of Profibus DP. High process efficiency and availability are also provided by the field buses Profibus PA or FF (Foundation Fieldbus) H1 for connection to safety-oriented process instruments such as pressure transmitters from the Sitrans P Family.

Just-in-time maintenance

“We envisage enormous potential for our customers in the chemical industry to increase their competitive standing – in areas such as more efficient and user-oriented control system operation, improved strategies for safe plant operation and need-based maintenance. We will be presenting innovative solutions aimed at leveraging this potential at the ACHEMA,” says Miguel-Angel Fernandez.

Comos and Simatic PCS 7 provide support throughout the engineering and operating phases. A condition-based maintenance concept ensures optimum monitoring of plant components (Condition Monitoring). An integrated workflow supports the execution of maintenance work, allowing documentation data to be used directly in the field with the aid of mobile devices. In addition, Comos WalkInside enables complete immersion into the plant and use of the 3D virtual reality model for training and maintenance purposes.
Spotlight on energy management and energy saving

Energy management all along the value chain is increasingly becoming a focal issue for chemical corporations. In this field, Siemens offers scalable energy management systems for every level, starting with solutions involving the Simatic automation system, the process visualization system WinCC or process control system PCS 7 for energy management on the operational level through to comprehensive analysis using B.Data for the management level. B.Data supplies detailed analyses and reports taking into consideration key performance indicators (KPIs) for electrical current and energy flows, so permitting targeted energy planning and subsequent tracking of energy efficiency measures. The company's energy-saving offering is supplemented by energy-efficient drive and power management systems which leverage significant potential for operating cost savings of up to 70 percent. These systems allow any drive component (motors and Integrated Drive Systems) to be integrated into any drive system, any automation environment and into the entire life cycle.

Sustainable chemical production

Environmental protection and the efficient use of resources are also key goals for the chemical industry. The challenge faced by chemical corporations is to successfully reconcile the most environmentally friendly system of chemical manufacture possible with profitable business practice. Innovative Siemens technologies enhance production performance and at the same time help to optimize the input of raw materials, enhance product quality, save energy and manufacture chemical products from renewable raw materials. Sustainability can be achieved by the intensive use of modern technologies, by deploying closely interlinked processes and intelligent communication systems. This is where Siemens offers a series of technologies aimed at the achievement of optimum use of resources: For instance Totally Integrated Power (TIP) for the seamless distribution of electrical power on the medium voltage level right through to the wall outlet. Energy-efficient drive solutions for pumps, ventilators and compressors also help to reduce energy consumption. The use of an energy management system or energy consultation by experts from Siemens are additional elements which can contribute towards greater sustainability in chemical manufacture.
Industry-specific expertise the world over

The globalization process which is driving ever greater competitive and cost pressure throughout the industrial world has not left the chemical industry unscathed. As an experienced solution partner, Siemens provides invaluable support to its customers with a globally available network of industry-specific experts and technical services, special life-cycle servicing agreements, a comprehensive portfolio of advisory services and innovative concepts. As a Main Automation Vendor (MAV), industry supplier Siemens assumes responsibility for complex planning processes, with a concept which encompasses the fundamental technology – from the design phase through engineering to maintenance. This allows chemical corporations to reduce the work and costs invested in plant and project management by up to 20 percent.

Solutions and services spanning the entire plant life cycle

Products and solutions from Siemens permit chemical corporations to improve the efficiency and cost structure of their entire plant and product life cycle. Research and development departments benefit from laboratory scale solutions. Simit Simulation Framework and the engineering solution Comos provide efficient plant management platforms which link the entire process technology with plant planning, virtual commissioning and automation. In the field of production and maintenance, process control system Simatic PCS 7 makes a decisive contribution to plant and process optimization. XHQ Operations Intelligence enables plant performance management and the analysis of operational and business data as the basis for informed decision making and for dashboarding in real time.

Plant data services such as Control Performance Analytics allow process and status data from control loops to be captured from the PCS 7, analyzed and used as the basis for selective measures to enhance efficiency, quality and throughput. Remote services from Siemens allow chemical corporations to also operate their automation solutions at arm’s length. Producers aiming to update or modernize their operations benefit from solutions for greater plant availability, investment security and reduced total cost of ownership (TCO) over the entire life cycle, for instance using migration concepts, modern plant control consoles (HMI+) or Simatic PCS 7 life cycle service contracts.
For further information on the topic of performance and safety in the chemical industry, please see [www.siemens.com/chemie](http://www.siemens.com/chemie)

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