



Modern batch production at Stepan company

OBJECTIVES:

- Increase in operating efficiency
- Control system maintenance costs reduction by globally applicable solutions implementation as well as maintenance costs reduction
- Process parameters control improvement, increase repeatability and product quality
- Shorter time for the new product launch on the market as well as waste reduction

CHALLENGES:

- Very short time to implement and switch over the system
- Restrictive safety requirements in the chemical industry
- Alarm and Interlock Management (alarm and interlock system) to provide installation as well as personnel with all safety standards
- Creation of a simulator reproducing the production process and the work of the entire factory

PRODUCTS/SERVICES:

- Wonderware InBatch
- Wonderware System Platform
- Wonderware InTouch
- Production Process Simulator
- Siemens Simatic S7-1500 controllers
- Danfoss VLT® FC302 drives

BENEFITS:

- Increased production efficiency / shortened production cycle by approximately 2 hours (for some products)
- Precise control of production process parameters
- Improved quality and increased product repeatability

Stepan, a chemical company, is the world's largest manufacturer of aromatic polyester polyols. Production facilities are located in North America, China, Germany and in Poland – in Brzeg Dolny. Based on decades of experience and knowledge as well as thanks to the usage of innovative technological solutions,

Stepan offers products of the highest quality, ensuring ease of processing and excellent properties of final products. Our offer for local and global customers includes polyester polyols for production of:

- composite and insulating panels with a core of polyisocyanurate PIR foam,
- insulating spray foams, technical insulation,
- C.A.S.E. (Coatings, Adhesives, Sealants, Elastomers),
- flexible foams



Stepan employees during production preparation

Challenges

In the chemical industry, there are many requirements for managing the safety of manufacturing processes. The batching, mixing and processing of raw materials through chemical reactions takes place in a closed system, which increases employee safety. In addition, a control system that provides thoughtful block management as well as precise maintenance of the set process parameters ensures the safety of employees, the production process and high quality of the final product.



Control-Service employees during the work on project

- Chemical plant personnel are tasked with:
- planning and starting batches,
 - recipe management,
 - tracking consumption of raw materials,
 - execute production according to standards,
 - maintaining high product quality, repeatable in every batch.

In some production plants in the chemical and food industry many operations are performed manually; entering recipes into the system, tracking the consumption of raw materials, reporting is done by means of a circulation of paper documents. Such a system is characterized by low efficiency and is often burdened with errors.

The advantage of IT systems dedicated for chemical or food production such as Wonderware InBatch is the full automation of

recipe handling and process execution thanks to their coupling with control systems and personnel support both: at the stage of testing the recipes before introducing them into production and during the subsequent optimization of product parameters.

The decision to implement the new system took into account the optimization of production costs, reduction of maintenance costs, and the need to reduce the cost of production

KEY ASPECTS OF SYSTEM IMPLEMENTATION

Use of appropriate software:

'Wonderware InBatch is an ideal solution for process manufacturing in such industries as pharmaceutical and cosmetics, household and industrial chemistry as well as food production. Customers using Wonderware InBatch increase the utilization of their machine park, improve operational efficiency and shorten the time to market for new products.'

– Arkadiusz Rodak, Product Manager, ASTOR

Cooperation with competent Stepan engineers:

'Cooperation with Stepan engineers was very fruitful. Their knowledge and experience, perfect understanding of the process, openness to new solutions and focus on common goals made the implementation a success.'

– Damian Majchrowski, Control Systems Sales Engineer at Control-Service company

System integrator flexibility during project implementation:

'We get support from them whenever we need it, whenever we ask for it. Thus for us, Control Service is not just our supplier, but our trusted partner.'

– Luis Felipe Rangel, Process Controls Engineer at Stepan company

Creation of software simulating the operation of the entire production plant:

'Control-Service developed the simulator according to our guidelines: they made it so good, it replicates the plant operation so realistically, that we could thoroughly test everything and improve the parameters of the production process. The result of system optimization, using the simulator, was shortening of the production cycle time and improvement of product quality. (...) The first batch of product after replacing the system with the new one was of better quality than the same batch produced using the old system.'

– Luis Felipe Rangel, Process Controls Engineer at Stepan company.



Central control room of Stepan Poland plant

of the old control system, but above all, the scalability of the solution on terms of plant expansion.

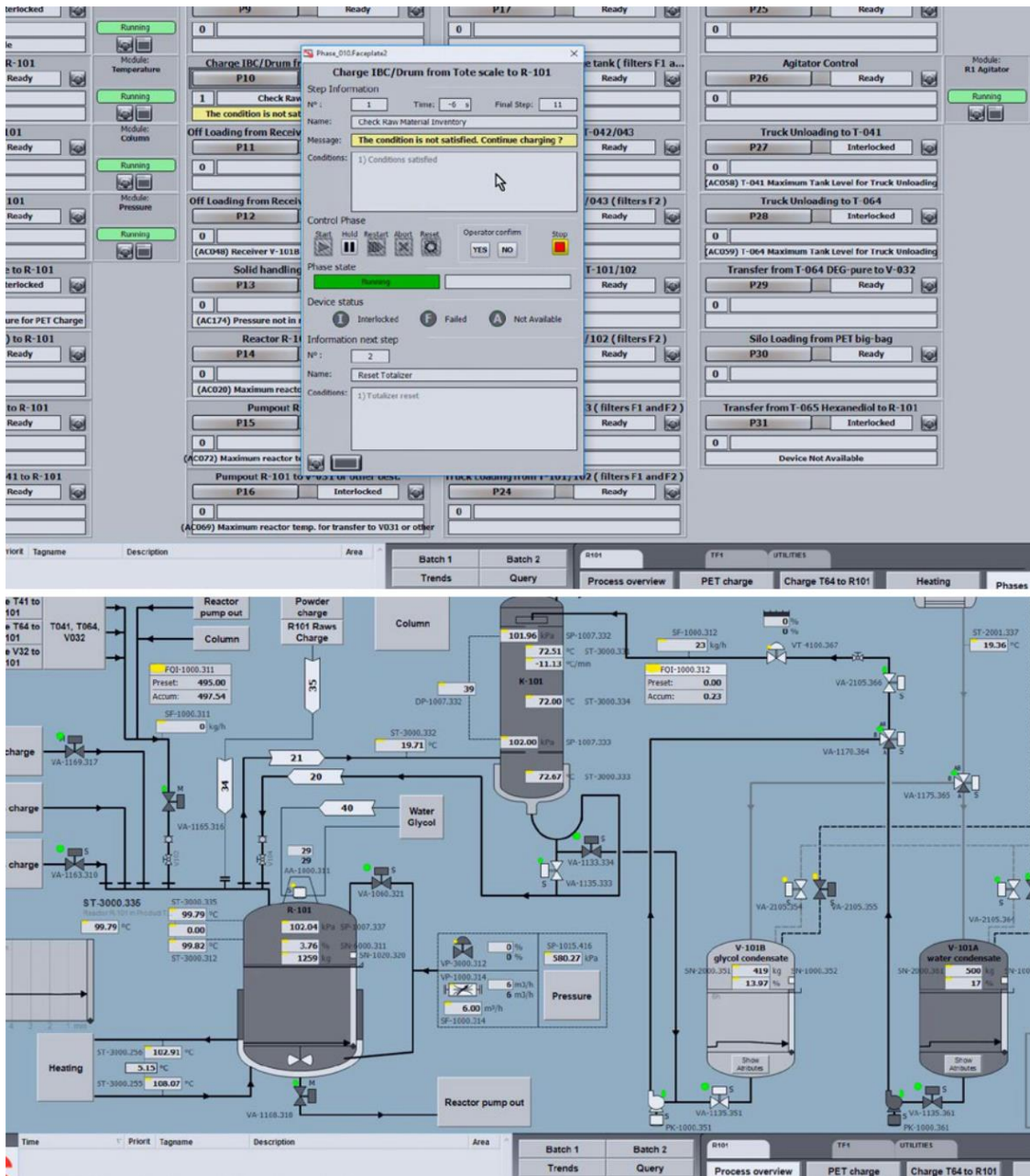
Decision on solution and integrator selection

The only solution already proven to meet the operational objectives and policy of advanced process safety was considered. Wonderware is a standard in Stepan factories all over the world, therefore, Wonderware products became the main components of the control system.

Stepan engineers were looking for a system integrator to cooperate in the project. One of the criteria was to have adequate competence, to use global standards and to use programming methods that would allow efficient programming and implementation of the advanced control system. Control-Service company met all these criteria and that is why it was entrusted with the implementation of the system.

Wonderware InBatch, while executing production, sends control signals to the devices and monitors their status, reacting dynamically to the occurring events. Having a complete system model containing information about raw materials, InBatch is responsible for all aspects of batch management including: selection of devices and starting batches on particular devices, process control, blocking and releasing devices, history of batches, material consumption, production, real-time management of batches and precise reporting of production in order to optimise it.

'Based on Wonderware InBatch, it is possible to build a flexible batch system from simple to the most demanding and complex production processes. Thanks to the built-in integration with the System Platform, the InBatch system has been combined with the Application Server and Wonderware InTouch visualisation, which results in a compact production environment oriented at easy and fast adaptation of applications to market requirements.' – says Damian Majchrowski, Control Systems Sales Engineer at Control-Service company.



Production process simulator created by Control-Service

Benefits of system implementation

‘InBatch has allowed us to better optimize our production, reducing cycle times and to control all parameters, including quality parameters, more effectively. It has also enabled us to better control temperature and pressure, for our entire production range. For some products, cycle times have been reduced by up to 2 hours. Reactor throughput is higher because there are no problems that

operators do not know and cannot solve.’
Now, they can take action and solve the problem themselves, if it arises’ – concludes Connie DeSautelle, Corporate Engineering Specialist at Stepan company. Stepan plant further plant development basen on modern technologies supporting production, which are proven not only in Brzeg Dolny but in Stepan plants all over the world – Asia, Latin America, Europe and North America.

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