Reconditioning of the process control technology

Investing into future

Beverage manufacturer modernizes for integration production

For the beverage manufacturer Emig island solution with barely existent visualization, automized with out-dated and partially discontinued hardware, made it difficult to run efficient production. Despite the strong growth of the last years the cost pressure and the narrow margins caused problems. The reconditioning of the process control technology of the mixing facility and the thus achieved integrated networking of all plant sections - i.e. from the goods receipt to the filling and packaging plants - improved the situation. And the solution complies with the requirements of the EU regulation 178/2002.

Today, the state of the art in the beverage industry often tends to grown structures with isolated automation applications for goods receipt, production, filling and logistics. Often there is neither a connection between the single systems nor to a superordinate system. In the best case a connection via serial interfaces exists, but most of the time records are kept in paper form. Stefan Ruff, the ProLeiT project manager, describes the initial situation in Waibstadt: “Blending of the products was effected with two systems: one system for the scales one and two, a second system for scale three. These two systems were connected with a serial coupling, other interfaces, e.g. to the lab, to the goods receipt or to the office management, did not exist.“ A system configuration that did not allow any batch tracking, checking of plant conditions or an integrated production.

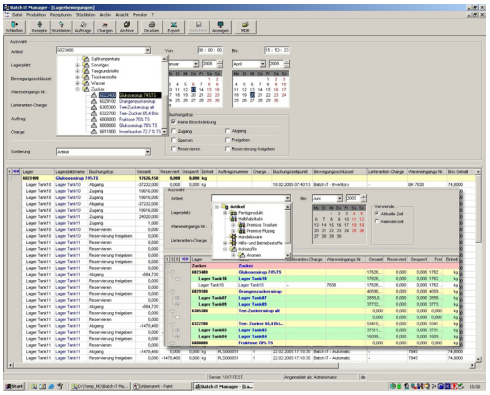
With the usual communication in paperform, to fulfill these requirements would become very time consuming and complex. Therefore Emig decided to modernize it‘s automation. Knud Hinrichsen, the Emig project manager, describes the requirements: „We needed a standardized and integrated materials management, in order to realize batch tracking from the receipt of the goods up to the filling lines - not only for the EU regulation 178. This was also about improving our job processing and the optimization of the raw material quantities by means of batch data. And of course we needed a much better visualization of our processes, not only to see, which valve is open or closed, but also to see if there were any equipment problems in the process.“

The new way

An integrated automation solution was essential for replacing the paper-consuming job processing. For Emig integration now starts at the receipt of raw materials. The automatic data acquisition not only collects supplier data such as supplier batch, but also batch-specific values, e.g. Brix degree, acid value and the expiration date of the delivered raw materials. Part of this data derives from the information of the delivery note, the other part from the Laboratory Information Management System (LIMS). The laboraty checks the raw materials on arrival, releases the material or blocks it if the goods are not up to standard. Thus the raw materials can be forwarded according to different qualities into one of the 40 raw materials tanks and be removed for production as necessary.
In order to achieve the planned results, considerable electrotechnical reconstructions were carried out and new software had to be implemented. Stefan Ruff describes the modifications: „Except for the existing Profibus of scale 3 the complete automation layer has been replaced. Before the project this layer consisted of 2 systems, one Simatic-S5 controller with visualization and a pure DOS-based PC-system with Interbus communication. Now a Simatic-S7 controller with decentralised peripherals constitutes the core of the system. The S7 controls all three scales as well as the complete sequential control. The hardware for the CIP-system, a S5 controller with ET200-periphery remained the same, we only integrated it into the communication network. At the main level we implemented Plant Direct iT, our basic process control system, with the modules Plant Acquis iT for the production data management and Plant Batch iT, the batch system with integrated materials management and batch tracking. Interfaces to the ERP-system and to the LIMS are realised with our parameterizable coupling Plant Connect iT. Moreover, we integrated a web-based report management so that every authorized employee has access to the production data.“

INFO

Company:	Emig GmbH & Co KG
Sector:	Beverages
Location:	Waibstadt
Country:	Germany



Storage transactions and stock overview

With the process control system Plant Direct iT basic functions such as valves, motors, controller and scales (Siwarec U) have been realised and a distinct improvement of operating and control could be achieved. The extensive library contains modules for monitoring and control of devices in the process, as well as monitoring features, e.g. for limited values and

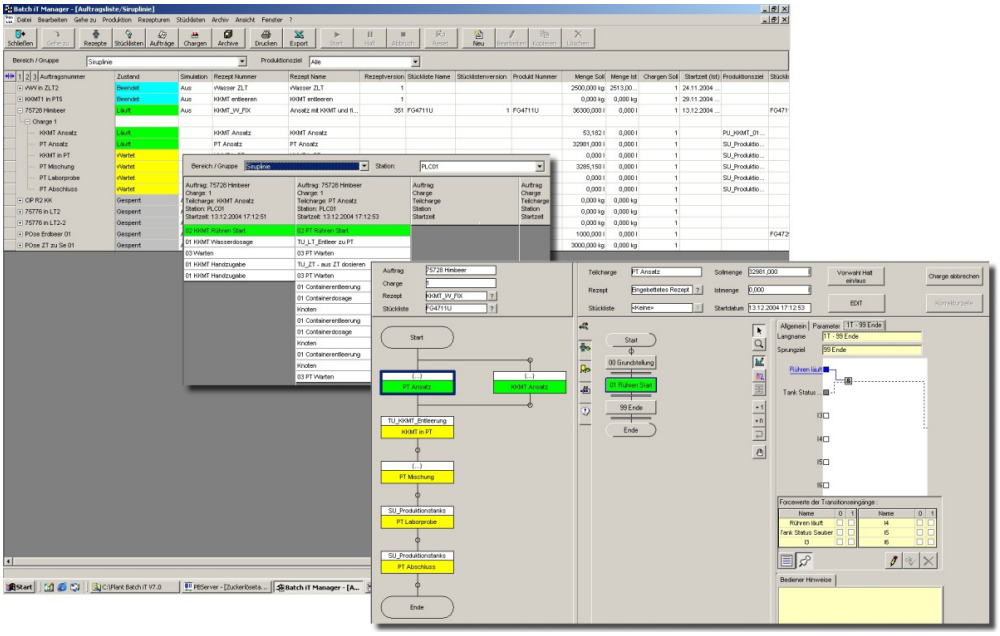
bus diagnosis. The software forms the basis for all other modules of the Plant iT system. It also realises the interfaces to the process, to the operating and maintenance staff as well as to the receipt of goods, for which a special user interface has been created.
Plant Batch iT takes the functionality and the data of Plant Direct iT as a basis and covers the specific requirements of recipe-controlled batch processes. The Batch iT Manager provides the user with fundamental functions such as compilation and administration of recipes, bills of materials, process descriptions and productions orders; visualization and operation of the order processing; production control and the archiving of order data. By means of the module Material Management master data can be created and administrated and transaction data can be stored batch-precisely. A statistics function supplies overviews of the current stock, of consumption and production data as well as batch specific evaluation possibilities.

The Production Data Manager Plant Acquis iT acquires process, production, operation and machine data in three different ways: continuous data acquisition, event-driven data acquisition or manual data acquisition. Time-, shift-, order-, and batch-related evaluations are possible. Communication between Plant iT and the super- and subordinated systems FOSS (ERP) and LIMS is realised with the parameterizable link Plant Connect iT.

The new world

Today the Emig automation solution consists of a process control system with batch system, materials management and coupling to all other systems, which are relevant to the production. At the receipt of raw materials the order data is visualized, completed by the user and returned for commercial processing. The production gets the production orders with product and target quantity from the ERP-system. After processing the orders it returns the order data with actual quantities and consumptions. The laboratory gets data and samples from the receipt of raw materials and the production, creates new or modified bills of materials for recipes and returns their results.
According to the production order from FOSS the master recipe from the Batch iT Manager is passed together with material stocks from the materials management to the recipe optimization, where the data is compared with the raw materials quality from the LIMS, the available individual units of the plant and the quantities in stock. Then the data is returned in form of a production recipe to the batch system. For processing of the batch the batch system controls the corresponding controlling devices, motors and pumps in the production in such a manner, that the predefined quantities are forwarded automatically to the scales and blending tanks respectively. Dosings from containers or manual additions are also controlled by the system. Possibly, intermediate working tanks will be used. This may be for homogenization or in order to pass the juice through a filter into the blending tanks. At the end of each batch it is analysed if adjustment quantites of water, raw materials or flavors are necessary, before releasing the juice and pumping it to the filling area.
All information from the truck receipt, the laboratory and the production is merged into the materials management and updated in case of deliveries by truck or removals for the production. The materials management administrates master, production, consumption and inventory data on the basis of informations from the connected systems and reports it to the ERP-system (FOSS). The ERP-system generates the production orders and sends them to the control system. Ruff again: „The materials management is the central data hub, to which all connected systems have access. Primarily this enables automatic production with integrated job processing and batch tracking utilizing FOSS, LIMS, the process control system and receipt of raw materials.“

This solution allowed Emig to increase production efficiency and ensures a better quality of internal communication. Hinrichsen emphasizes the constructive and targeted cooperation of Emig and ProLeiT and also the flexible and sensible realization of the project. The fact, that the production should carry on without stopping and that Emig deals with very delicate products, had to be taken into account at any time of the project.



Order list, batch marix and graphical detailed view of an active batch