IN FULL CONTROL Compact automatic weighing solution for the production of floor cleansing and preserving agents

Fully automatic production systems in the chemical industry need compact, high-accuracy weighing solutions which ideally should control the entire process chain - from the delivery of raw materials to their processing along the production line and decanting of the finished product. A complete solution consisting of a PC-based recipe manager and a batching controller was installed for the production of floor cleansing and preserving agents. Read on for further details.

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Enhanced productivity and a consistently high level of product quality are in demand in the chemical industry today more than ever. This is no mean challenge considering the large number of product variants and raw materials involved, not to mention the high standards of production reliability and safety that are taken for granted these days. Since 1955, CC-Dr. Schutz GmbH, has been developing, producing and selling high-quality, gentle cleansing and preserving agents for floor coverings such as carpets, linoleum, PVC, parquet and laminate for household and industrial applications. In June 2000, the original production facility in Bad Pyrmont was moved to a new site in Hessisch-Oldendorf (both Germany) in order to meet the spiralling demand. This was taken as an opportunity to extend the company's capacities in research and development as well as in production.

For this project E&E Verfahrenstechnik GmbH has been in charge of the planning, project-design, construction, fabrication, assembly and commissioning of the complete line for the production of cleansing agents. The process automation of the plant with weighing technique and dosing control PR 1730 has been realized in cooperation with GWT Global Weighing Technologies.

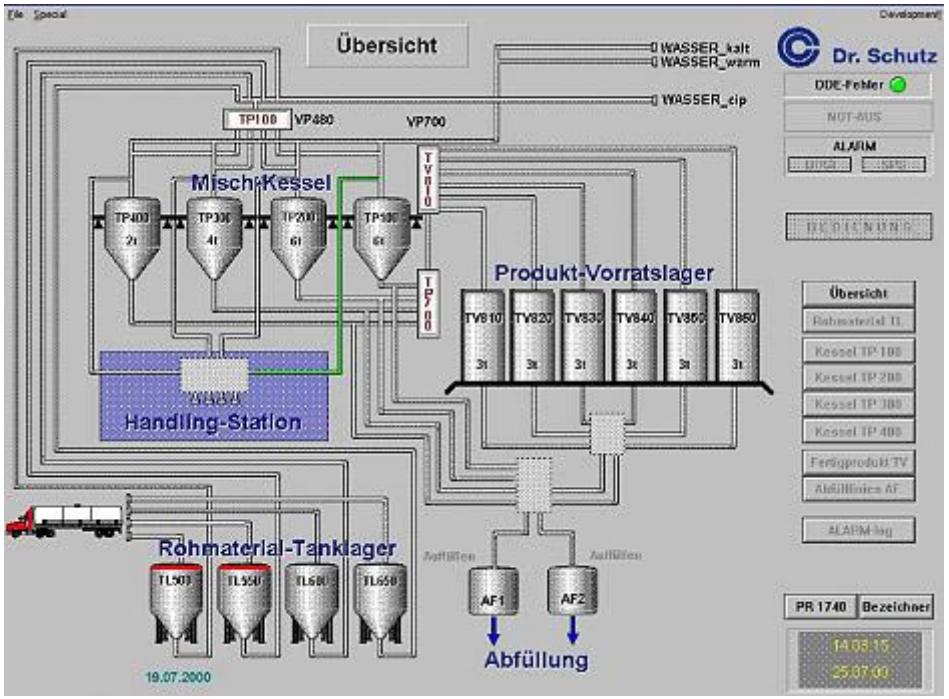
Four parallel recipes

The PR1730 batching controller simultaneously handles four parallel recipes for batching, mixing and stirring on four production lines. I/O process signals are exchanged on an Interbus S fieldbus under the supervision of a higher-level control system consisting of the PR1740 recipe management system and a process visualization system equipped with Wonderware InTouch software. All automatic and manual operations are completely visualized in process displays. Menu-guided operations and filling the raw material tanks are performed likewise via the visualization system.

Delivery of raw materials to the tanks is operated and monitored by the higher-level control system. A total of around 400 materials are automatically managed this way. Each of the four production lines consists of a 2, 4 or 6 t mixing vessel supported by high-accuracy S-type load cells. The weighing units feature a resolution of 0.01%, which is equivalent to a remarkable system accuracy of 0.1% with a maximum load of 6 t. Rubber bearings specially developed for weighing equipment dampen the vibrations of the stirrer during the batching operation.

The production process

Bulk materials are automatically fed in batches from the raw material storage tank. Powder and liquid additives are supplied to the mixer semi-automatically via a drum decanting unit. Additional ingredients can be fed in by hand via a manhole in the vessel. The operator is guided during the semi-automatic and manual operations by the process visualization system. All these operations are reported by the higher-level PR1740 control system.



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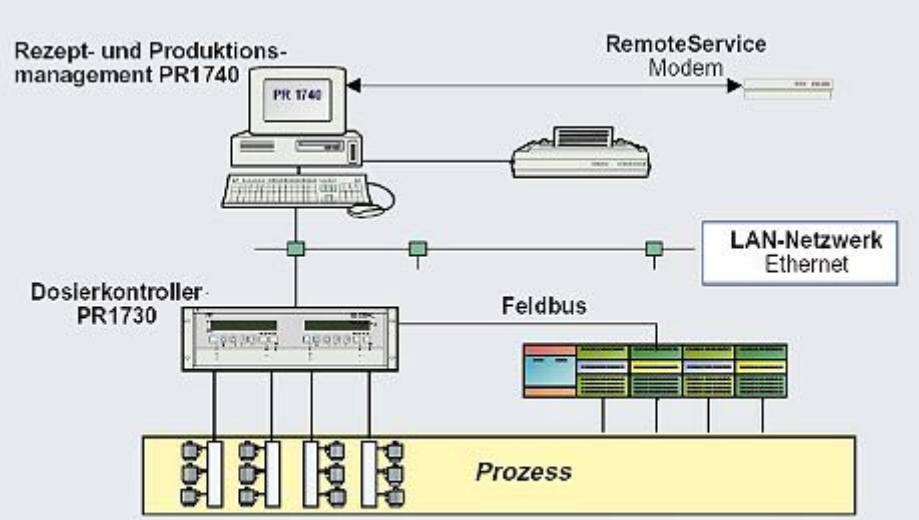

Die Systemarchitektur: Dosiersteuerung PR1730 mit Feldbus Interbus S und Rezept-manager PR1740 sowie Prozessvisualisierung InTouch

With correction function

A special feature of this automation solution is correction after pH laboratory sampling. Different raw material concentrations can cause product variations which have to be corrected in the actual batch. After checking the pH-value of a sample, the operator can use the correction function to enter a new set-point for each individual component of the previously handled recipe. Re-batching the components of a recipe with new setpoints is possible at any time. These postbatching quantities are then automatically included in the batch report. The finished product is decanted either into the product storage tank or directly into two decanting units, from where the cleansing agents are automatically filled into receptacles such as cans or PE bottles. Decanting is performed via the process visualization system.
Alarms are displayed, stored and acknowledged likewise in the visualization system. Batch, consumption and production reports are printed out by the recipe management system and stored in an MSAccess database. Maintenance and servicing are performed by means of a manual control function, which can also be used to stop and re-start each production operation by hand.

Password protected

This special manual control function provides unlimited access to all the valves and motors via the process visualization system. Manual control functions require System architecture: PR1730 batching controller with Interbus S fieldbus and PR1740recipe manager plus InTouch process visualization. a password, i.e. they are only accessible to authorized personnel. The system's structure (see the figure "System architecture") is a compact system composed of standard hardware and software components. The higher-level control system is installed on a Windows- NT platform and uses an MS-Access database for recipe, material and production ata management. Recipes are generated in the PR1740 recipe manager, i.e. the required material quantities are allocated to the relevant raw materials and the overall process sequence is defined. A unique combination Production orders are entered and started with the higher-level control system, which transmits the recipes to the PR1730 batching controller via a serial interface. The batching controller is a unique combination of weighing technology and PLC in a single system. During execution of the individual recipe steps, e.g. batching, mixing and stirring, the actual process is controlled via the Interbus S fieldbus. If required, the higher-level control system an be connected to a remote system at GWT's head office in Hamburg. The GWT service department is then able, for ex-ample, to provide fast problem analysis or demonstrate functions to the customer's operator while the system is actually running. So far the remote service function has not been used for Dr. Schutz – the plant has been working without a single hitch ever since it was put into operation in June 2000.

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