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Ingenuity for life

The many lives of plastic - dosing processes in recycling

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High raw material prices, high disposal costs as well legal requirements result in a more conscious use of the raw materials. When a product can no longer be used, the question of whether its raw materials can be recycled arises. After all, these can be used again as recycling materials to manufacture new products. Used plastic products from the consumption sector are already recycled to this purpose. The right mixture of new raw material and returned goods is therefore of high economic importance in plastics processing.

Corresponding dosing processes play an important role here.

The task

Bolder automation GmbH with its headquarters in Limburg, Germany, has been operating as plant manufacturer for dosing and bulk materials technology for more than 20 years. In the process the company has specialized in gravimetric dosing and weighing as well as the automation of extrusion plants and material conveyance. Bolder automation places its trust in SIMATIC solutions from Siemens for control systems.

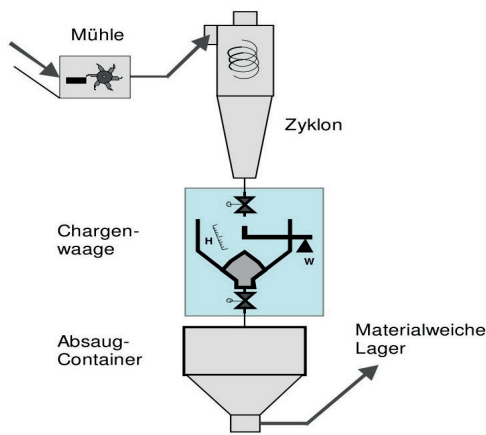


SIWAREX WP231 is seamlessly integrated into the SIMATIC environment

In industrial production the reduction of rejects through optimized process control already plays an important role in the production course. The advantage of using the remaining rejects is that they can be returned into the production process without greater impurities. Raw materials that have already been used are a different matter: PET bottles, window profiles, agricultural sheets and other recycling materials have to be reprocessed since the purity of the material can no longer be ensured. To ensure cost-effective plastic production the right mixture of new material and returned goods is therefore decisive. This has to be controlled through an adequate weighing process.

The solution: Weighing technology in the conditioning process

The conditioning process consists on the one hand of the conditioning in which the separation, washing and dust extraction of the recycling material is effected.



picture 1: The automatic scale CTW from Bolder automation is directly integrated into the material flow

After granulation the conditioned raw material is loaded onto the scales through a hopper. Weighing is carried out via the automatic scales CTW. This means that only the beginning and end of the quantity detection is specified (Picture 1).

The weight detection starts at an empty hopper with the weight zero. Subsequently the weight of the filled-in material is determined and apportioned to the total quantity.

In the plant solutions from Bolder automation for so-called batch weighing the emptying process involves two integrated flaps. These open symmetrically to 300 x 300 mm. This allows light material as well as material that flows badly to flow out of the hopper.

Filling can, on the other hand, be effected through valves, dosing units or other units. The design must always take into consideration the respective material and its properties such as the filling volume, flow properties or the bulk density of the material.

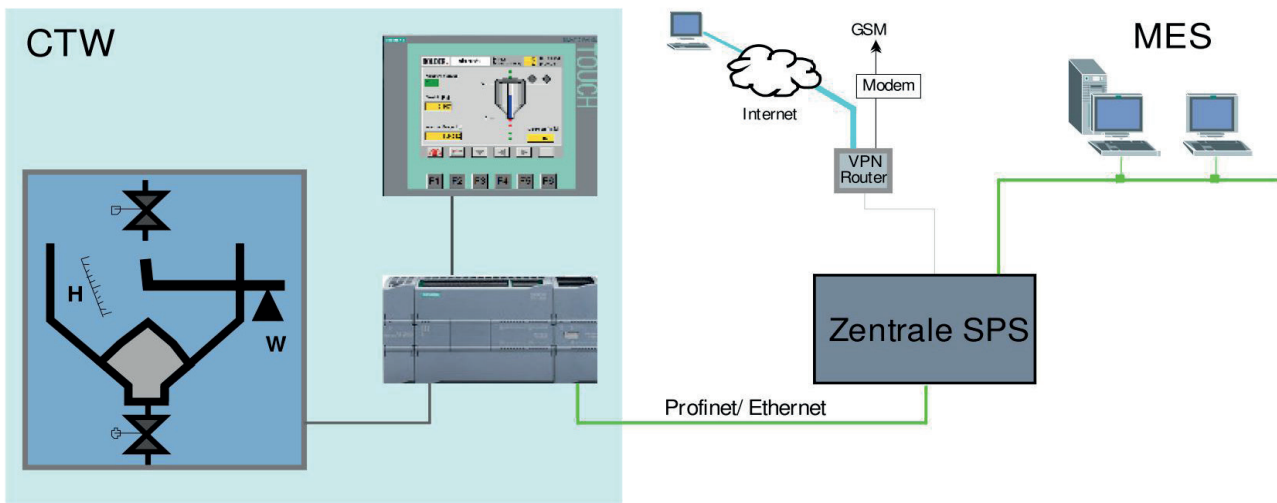
Realization of the scales at Bolder automation are effected in accordance with these requirements.

Integration in the automation system

Controlling of the automatic Bolder automation scales is effected via the SIMATIC S7-1200 automation system. The Siemens electronic weighing system SIWAREX WP231 used here is integrated into the SIMATIC environment and can be connected directly with the S7-1200 components through a slide-on plug. All the functions such as the weighing process, the level monitoring or the valve control are executed autonomously. Detection can be started and terminated via a touch panel. Material weight, current throughput, the accumulated quantity as well as the operating status are also visualized. (Picture 2).

The connection to a central PLC also allows the execution of programmed jobs. A PC can be connected via the default Ethernet interface in order to parameterize the SIWAREX WP231 electronic weighing system. All the data such as weight value, status, tare, commands and messages are transferred via the Simatic peripheral equipment. The parameters of the data records can be set via the SIWATOOL software or via an operator panel connected directly to the weighing electronics.

The electronic weighing system is integrated into the plant software by means of a ready-to-use function block. In contrast to serially linked weighing electronics, SIWAREX WP231 does not need costly additional modules to link it to the SIMATIC environment.



Picture 2: Controlling of the automatic Bolder automation scales is effected via SIMATIC S7-1200. SIWAREX WP231 is used as the electronic weighing system.

The benefit

The electronic weighing system provides extensive diagnostics options such as controlling the weight course and the monitoring and the signaling of limits. The high resolution of up to four million parts ensures high-quality reliable weight detection. In the case of machines from Bolder automation the representation and summation precision of the determined quantities is so high that no quantity limitation and no resolution loss is to be expected - not even when the detection is only reset to zero every few years.

A further special feature of the complete system is the monitoring of the electrical and pneumatic supply systems. After all, a failure of the supply system would block the complete material flow. Here a function of the control system provides a solution: In the case of failure weighing is terminated, the last information is stored and the scales are switched over to passing-through mode. Regular operation can be continued after the alarm has been handled.

Additional fields of applications possible

Used in conjunction with SIWAREX WP231, it is possible to configure freely programmable, modular weighing systems in SIMATIC, which can be adapted to company-specific requirements as needed.

Thanks to the modular structure of the scales it is thus possible to realize batch dosing for high throughput rates, meaning from one to four tons per hour and two to six different components. The components can be fed through quick-acting valves or dosing units. The individual raw materials are filled into the scales one after the other in accordance with the recipe and then emptied together as a batch. Under the scales a mixer ensures sufficient blending before the resulting new material is then extracted and processed further.

A corresponding software is also available for the SIMATIC S7-1200/1500 control system with SIMATIC ET200SP and SIWAREX WP231.

SIWAREX WP231

Through its integration into SIMATIC S7-1200 the SIWAREX WP231 provides uniform design technology and consistent communication. Stand-alone operation without a SIMATIC CPU is also possible.

Commissioning of the weighing electronics using SIWATOOL or directly through a connected HMI panel is quick and easy. In addition to extensive diagnostic features, the SIWAREX WP231 provides a legal-for-trade display and can even be used for applications in Zone 2 hazardous areas.



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