To maintain consistent quality of flavor in cigarette production, precise blending ratios are required. One way of influencing these ratios is by using optimal weighing systems. One European tobacco producer decided in favor of using appropriate belt scales.

Cigarette production in the factory is divided roughly into tobacco preparation (primary) and subsequent cigarette production (secondary). In tobacco preparation, the leaves are first separated from the stalks within the leaves, the “ribs”. Depending on the type of cigarette and the recipe, the cut tobacco leaves are later mixed with ribs, although these are not necessarily from the same tobacco leaves. They are obtained separately. Depending on the type, cultivation area, and blend ratio, these ribs will later help to influence the flavor and nicotine content of the cigarettes.

In production, different types of ribs are blended with the cut tobacco leaves in a defined recipe. A precise and consistent blend ratio of all ingredients is extremely important here. It determines the later taste and nicotine content of the finished cigarette.

The ribs are added over several lines: The ribs are first emptied from bulk bags into a charging hopper, and then discharged onto the belts via conveyor belts. These discharging belts in turn load a collection belt on which the individual types of ribs must lie on top of each other. The material infeeds must be precisely coordinated with each other here, and the respective throughput quantities of ribs must be controlled according to a setpoint.

Following this, the blend is extracted from the collection belt by suction and forwarded for further processing.
The task: Enhanced overview through SIMATIC integration

To record the throughput quantity, the existing conveyor belts had to be retrofitted with belt scales. The low and strongly fluctuating delivery rate with a maximum of 2500 kg/hour was unusual for the use of belt scales.

The small available space was a challenge for installation: Between the carrier rollers, there was only around 700 mm of space available for the envisaged weighing modules.

Recipe control was already handled using SIMATIC S7. For this reason, the customer also wished to use transmitters as SIMATIC S7 modules for the belt scales. This ensured full integration of the belt scales into the SIMATIC environment – all measured values and messages can be viewed immediately, and a shared touch panel is used simultaneously for visualization, programming and operation.

The answer: Siemens belt scales for cigarette production requirements

Due to the flat belt, the low throughput quantity and weight load on the belt, a decision was made to use Siemens belt scales of the type WD600 Weighdeck. Specially developed for the flat belt conveyors in the tobacco, food and pharmaceuticals industries, the WD600 fit perfectly into the existing belt construction, and it was installed with minimum effort.

The stainless steel frame of the WD600, and particularly the slider beds of abrasion-proof and Teflon-free material, provide valuable benefits for cigarette production in particular. After all, even the smallest Teflon particles can not only significantly impair the flavor of the cigarettes, but also release hazardous toxins. The WD600 complies with FDA/USDA requirements as well as with the European Directive EC1935/2004.

The material load on the belt is transferred via the slider beds to two load cells integrated into the frame. This takes place without redirections or pivots so that load changes are detected directly and without delays.

The load cells are attached to the outside of the conveyor belt rails, and this enables direct access for service or cleaning purposes, for example. A mechanical stop integrated into the frame serves as overload protection. This design minimizes material deposits and can be cleaned very easily. The long weigh span on the slider beds of the WD600 Weighdeck means the material spends more time on the scales, thus achieving improved measuring accuracy. The Weighdeck is adjusted using adjustment weights that can be hung on the side, or, as is the case with this customer, using adjustment chains. These consist of small rollers and they simulate realistic conditions with a defined weight on the running conveyor belt.

The belt speed is detected on the individual belts using SIMODRIVE incremental encoders at 1000 pulses per revolution. This high resolution enables precise control of the throughput quantity.

The Siemens SIWAREX FTC weighing modules were selected as transmitters for the belt scales for connecting to the SIMATIC S7. These are SIMATIC modules that are seamlessly integrated on the hardware and software side, and that directly evaluate the load cell signals and the belt speed measurement.

This means it is possible, among other things, to provide the current delivery rate, weight load, belt speed, and total quantity as a data set for further high-speed analysis in the PLC.

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The benefits: Precise blend improves quality

On the basis of programmable recipes, the SIMATIC S7 controller handles setpoint specification for the individual throughput quantities, taking account of the individual positions on the collection belt. The quantity is controlled via frequency-regulated belt speeds on the basis of the measured throughput quantity values of the WD600. A Siemens touch panel with all the process values and messages is located in the control cabinet door for visualization and operation. Also integrated there are the programming and service functions for the SIWAREX FTC belt scale transmitters, thus rendering additional transmitters unnecessary.

With precise throughput values, the Siemens WD600 belt scales with the SIWAREX FTC transmitters provide the basis for precise blending ratios between the cut tobacco leaves and the different sorts of ribs. This is the prerequisite for high quality in the subsequent cigarette production.

SIWAREX FTC

- Versatile weighing module for belt scales and differential scales
- Integration into SIMATIC S7 and SIMATIC PCS 7
- High measuring rate of 10 ms
- High accuracy
- Extensive diagnostic functions
- Parameter assignment using SIMATIC, HMI or notebook with SIWATOOL

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