Precise vacuum weighing systems for low-dust kneader feeding

An extremly high standard of quality and efficiency

Maximum product quality

Fully automated handling of raw ingredients Process-optimized kneader feeding

Extremly small amount of dust produced

The requirement

The following specifications had to be taken into consideration in the design of the new plant:

- Separation of metal and reliable safety screening of all raw materials used
- Flexible, simultaneous feeding of several kneading lines
- Extremely precise, fully automated weighing of the components
- Reduction of dust thanks to closed systems
- Maximum availability with very high throughput rates
- Integration of the process technology into in-house process control and visualization technology

The customer

Harry-Brot is one of the largest bakeries in Germany. The company produces approximately 60 varieties of bread and bread rolls which are mainly sold in northern and central Germany. In addition, Harry supplies more than 5,000 baking stations in grocer's shops with a rapidly rotating range of pre-baked breads, frozen bread rolls and baguettes. The bakery products are produced in eight baking plants. In addition, Harry has 46 outlets which supply more than 9,000 shops every day. The company was founded in 1688 by Johann Hinrich Harry in Altona. In 1890, the bakery became an industrial bakery. Harry is now owned by the tenth generation of the same family.

THE SOLUTION

"As a result of our positive experience, we have been increasingly relying on vacuum conveying systems for some time now. With these systems, feeding the ingredients into the pneumatic conveying line is much easier. Even if we have a leakage, no dust escapes and this means production is always clean."

Volker Hartung, Production Manager at Harry Brot

The task

The newly built, state-of-the-art frozen bakery products factory started operations in Troisdorf in 2006. Approximately one million bread rolls are baked in the factory every day, in three shifts. AZO's task was to feed all of the dry ingredients to the various mixing and kneading lines reliably and fully automatically. It was not just a case of achieving high throughput rates with the major ingredients (flours).

It was also extremely important to meet the narrow tolerance limits during the weighing of the minor components and ingredients such as baking improvers and salt. In addition, it was essential to exclude any possibility of any foreign bodies getting into the production process.

The customer wanted clean, dust-free handling of the dry ingredients. Another important factor was the dust extraction of the kneading bowls without any loss of material.

AZO® SOLIDS

Storing and supplying the bulk quantities

The AZO solution

Storage of various flours in outdoor silos

The fibreglass-reinforced plastic silos provided by the customer were equipped by AZO with filling lines that have protective screens integrated into them. Vibration bottoms combined with rotary valves in the skirt area ensure that the ingredients are discharged more safely and uniformly. Any cuttings are removed from the product by using a metal separator. Safety screening is subsequently carried out with a cyclone screener, before the flours are transported to the individual kneaders. All of the coarse material is separated into a coarse container which is changed during each shift, thus ensuring that no impurities get into the production.

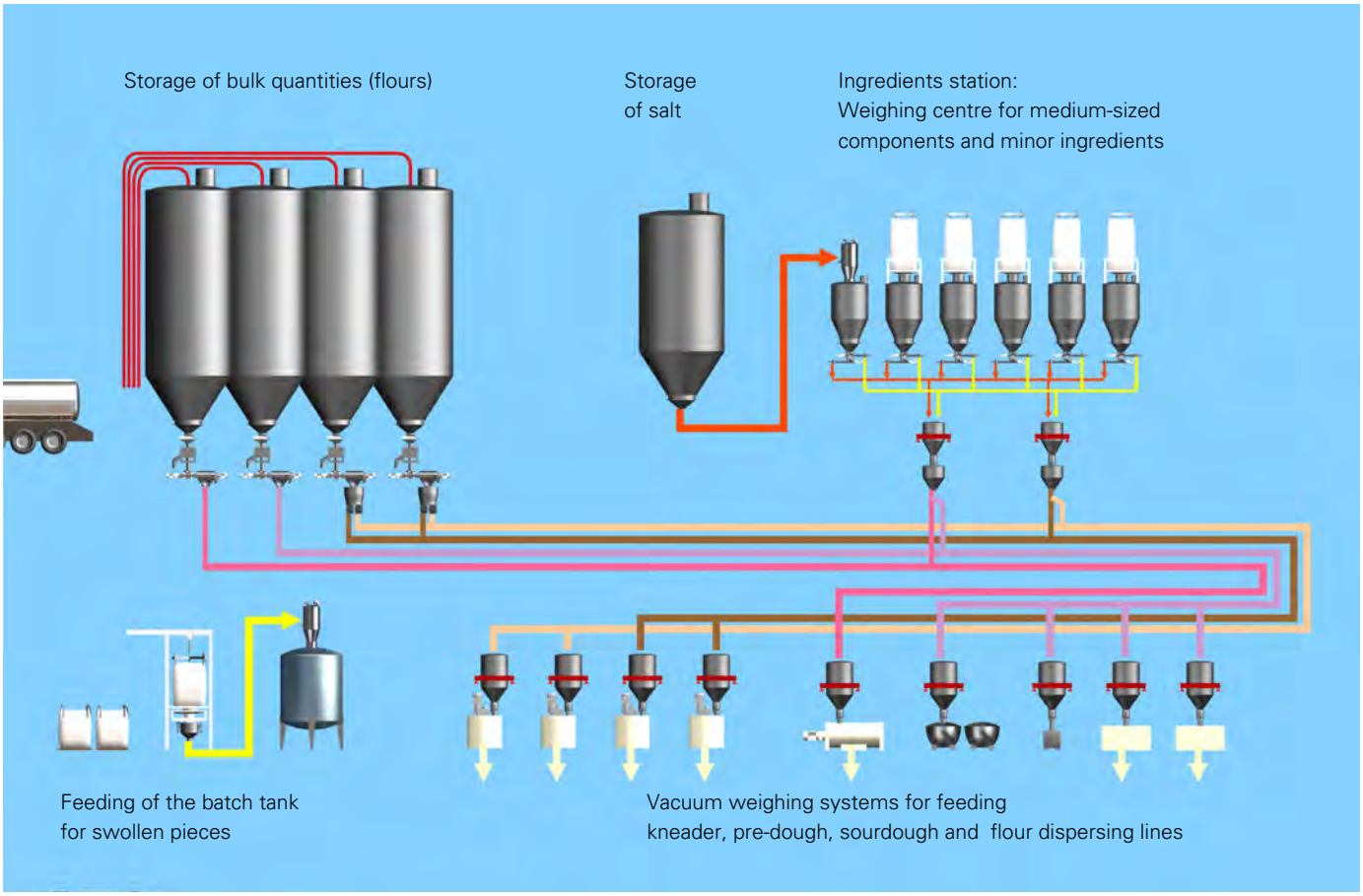
The product can be fed into two conveying lines via rotary feeders at several silos. The products are diverted to the feeders via a diverting hopper.

Outdoor silos for storing bulk quantities

"We use AZO's free-fall cyclone screeners, i.e. the product is dosed to the screener via a rotary valve and is fed into the conveying line to the vacuum weighing system through a rotary valve at the fines outlet. This means that the screener works at atmosphere pressure and provides much better results than inline screeners which we have used elsewhere."

Volker Hartung,
Production Manager at Harry Brot

Skirt with cyclone screener and diverting hopper



Material flow chart

Weighing systems for feeding kneader lines with bulk quantities, medium-sized components and minor ingredients

Ingredients station for minor ingredients and medium-sized components

The ingredients station is a weighing centre for the minor ingredients and medium-sized components such as salt. A somewhat larger indoor silo made of seawater-resistant aluminium is available for salt, which is fed by silo vehicles. The silo air is dried to prevent the salt clumping. A vibration bottom with a dosing screw, which doses ingredients into a vacuum conveying system, acts as a discharge. The vacuum conveying system feeds one buffer hopper of the weighing centre. The remaining buffer hoppers, which are also equipped with vibration bottoms and fine dosing screws, are filled with raw ingredients from big bags from above. The big bags, which are delivered on pallets, are raised with a hoist to the respective buffer hoppers. They were connected and emptied in the buffer hopper by using the AZO dust-tight big bag connection system. The required amount is then dosed into two minor ingredient scales and weighed to the nearest gram, in accordance with the recipe. The precisely weighed batch is then transferred to a collecting hopper where it is ready for collection by the vacuum weighing system.

"With this system we can automatically access precisely weighed minor ingredients and medium-sized components which are very important for our recipe."

Volker Hartung,
Production Manager at Harry Brot

Ingredients station for weighing minor ingredients and medium-sized components, on the right: indoor silo for salt

Conveying scales for feeding the kneader lines

Vacuum weighing systems for feeding kneader lines

Several lines are fed with these vacuum weighing systems. These may be, for example, continuous kneaders, batch kneaders, pre-dough systems, sourdough systems or flour dispersing systems. In accordance with the recipe, the flours are vacuum conveyed from the outdoor silos into the conveying scales above the kneaders, the pre-dough systems or the flour dispersing system. To this end, a negative pressure is generated in the conveying scales by a vacuum pump. This negative pressure extends to the outdoor silos where it sucks the flour into the appropriate lines. Using the same principle and again depending on the recipe, the pre-weighed batches are then sucked from the ingredients station into the conveying scales. Once the entire batch is in the conveying scales, it is transferred to the subsequent process, whether this be continuous kneaders, batch kneaders, pre-dough systems or sourdough systems. Flour from the outdoor silos is exclusively provided via conveying scales in the flour dispersing system. Vacuum weighing systems are ideal for feeding kneaders, because they do not need a great deal of height or space and they operate in an almost dust-free manner.

„AZO vacuum weighing systems operate using a negative pressure in a closed system and, as a result, prevent dust from escaping during conveying. Transferring the ingredients to the subsequent process via kneader dust covers is also very straightforward."

Volker Hartung,
Production Manager at Harry Brot

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Vacuum weighing systems for feeding various production lines

Vacuum weighing systems with conveying scales for feeding various process lines

Vacuum weighing system with conveying scales for feeding the flour dispersing system

Feeding the dry ingredients
A vacuum conveying system is used to feed the swollen pieces system. The raw materials are fed to the conveying system via a big bag emptying station and conveyed by means of negative pressure to the swollen pieces system. There the raw materials are continuously fed to the batch tank via a rotary valve for further treatment.

Big bag emptying station with hoist

Conclusion:
"AZO's technology was very successfully installed, commissioned and integrated into our in-house control system. We are very pleased with the quality and functions, and are currently in the process of equipping other plants with AZO's technology."

Volker Hartung,
Production Manager at Harry Brot

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