

# Mixing and dosing

Daxner has built a CIP-enabled mixing plant with pneumatically fed large components and a fully-automated container system for a leading baking agent manufacturer.

An innovative design combines the requirements of modern baking agent mixing plants - large throughputs, very high dosage precision, minimised dust generation and cross-mixing and ergonomic operation and the easiest cleaning including CIP-cleaning. This was achieved through the combination of pneumatically fed-in large components and a fully-automated container system for the collection of medium and small components.

## Project Requirements

The system solution for a leading international baking agent manufacturer consists of a flexible automated mixing and dosage system for the production of a variety of prepared baking agent mixtures from many individual components, such as sugar, various flours, starch, cooking fat and other components. Daxner has developed an innovative process for optimum cleanability, dust-free powder handling with no contaminati-

on in order, as far as possible, to avoid any cross-contamination. A decisive criterion was the strict separation of products with allergens and allergen-free portions. Another requirement was a high performance level of up to twelve tonnes of ready-mix per hour. The cleaning system was selected based on the established hygiene plan. In consultation with the customer, Daxner decided that the best possible way of cleaning the components would be to use the COP (Cleaning Out of Place) principle, dry cleaning and CIP cleaning, i.e. automated wet cleaning based on the Cleaning in Place principle. The Daxner Container-Handling System (DCS) also met the requirement for a flexible product and production changeover. Other important aspects were, in addition to the high mixing accuracy (1:100,000), an ergonomic design, the prevention of dust accumulating and the fulfilment of the hygiene regulations and statutory requirements.

## Process engineering

All ingredients are divided into large, medium and small components. Large components are stored in external storage silos and pneuma-





tically fed to the two mixing lines. Medium components are stored in day silos and filled by mobile feeding stations with integrated control screening machines. From the daily silo they are conveyed by means of a dosing screw connected into a discharge device using the rough and fine dosing procedure into the underlying container or IBC (Intermediate Bulk Container) where they are dosed and weighed. The connection to the filling opening of the IBC is fully-automated by means of a high-precision double flap system. Pre-commissioned small components are added via Vib & Press manual feeding stations (including control screening and mixer) directly into the IBC. By means of a three-dimensional container transportation system, consisting of a stacker crane in combination with chain conveyors and shuttle systems, the IBCs are transported fully-automated to all collection stations (medium and small components) and, subsequently docked and undocked via the mixing lines to empty the collected product batch. The mixing system consists of a precision vertical mixer. The mixing principle is based on a counter-current generated in a rotating helical spiral in the mixer. Block fat is dissolved in the mixer by cutting rotors. The geometry of the helical spiral ensures that the product flows repeatedly over the cutting rotors. The mixer design complies with the highest hygiene requirements – with no corners or edges and with the highest surface quality. The batch mixer empties into the equivalently designed secondary mixer container with an integrated discharge mixer which is used concurrently as a storage tank for the high performance filling station. Both the IBC and the entire mixing system are equipped with



[1] Medium components are stored in day silos and filled by mobile feeding stations with integrated control screening machines. [2] Large components are stored in external silos and pneumatically fed to the mixing lines.



a fully-automated wet cleaning system (CIP) which processes the cleaning cycles including rinsing, washing, disinfection and clean water rinsing and a subsequent drying process.

### Technical Detailed Solutions

The container connection system using a high-precision double flap system complies with the highest hygiene requirements (pharmaceutical version) and consists of a stationary active half and a passive half mounted on the mobile IBC. As only the stationary active flap half has to be supplied with electricity and compressed air and/or control signals, the fully-automated docking of the transport containers/IBCs can be achieved. In addition, the passive flap halves hermetically seal the IBC inlet and outlet during the transportation process, which completely prevents any leakage of the goods being transported (allergens!). By this locking when docking any escaping dust and therefore any possible contamination during filling and emptying of the IBCs is prevented. The fully-integrated module of the active flap with its associated extraction mechanics

enables the rapid expansion and transport of the complete IBC connection module to the COP station. The hygienic design IBCs are transported via a stacker crane in combination with a sophisticated IBC shuttle transport system to the respective collection stations of the components and then to the emptying station via the mixing lines. The hygienic design mixing systems are fully CIP-enabled according to EHEDG and HACCP. A fully-rounded mixing chamber, no horizontal surfaces and optimised mixing tools ensure maximum hygiene and optimised cleanability. Additional, strategically placed spray heads and spray nozzles enable fully-automated wet cleaning and subsequent drying of both the mixers and the equivalently designed secondary mixer containers including a connection pipe structure. The system also has a fully-automated CIP wet and dry cleaning station for IBCs.

### Author

Christian Daxner, CEO  
Daxner GmbH  
Vogelweiderstraße 41  
4600 Wels  
Austria  
Tel.: +43 7242 442270  
Email: office@daxner-international.com