

Complex System Planning

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Generally all stakeholders talk of a stroke of luck when a production facility is built on a green-field site and if they are then incorporated early enough into the planning process. In contrast to building restrictions on

existing buildings which often require special solutions on the part of system builders, planners of new buildings generally have fewer such concerns to consider. Perhaps the client is expecting a particularly state-of-the-art and



Mixers and kneaders in the continuous dough system, Codos from Zeppelin Systems, can be combined based on the specified requirement.



Left photo: The external silos are installed on the roof of the raw material storage which involved specific structural requirements. Middle photo: The individual silos of the main components are built in such a way that they do not take up any space in building. Right photo: Ingredients are first weighed and then fed into the spiral mixer.

efficient solution with a high degree of automation which fully meets current and future requirements. Zeppelin Systems complied with this requirement in the construction of a production system for wheat-based biscuits and pastries and where the system builder was not only responsible for his core business – from raw material acceptance to dough delivery on the line – but also for the building design. As part of the plant planning process the customer provided key data about products, number of bakery lines and information on line outputs. Based on the submitted guide formulations, a quantity structure was determined by calculating the consumption of main, medium and small components and the liquid baking ingredients and this was discussed with the customer. The planning of the plant outlined below was then undertaken on this jointly agreed basis.

Storage

Already with the acceptance of the different flours, the high standards underpinning this new

construction became clear. Upon delivery the driver of the tank lorry must at no time access the production area, as the 50 tonne flour silos can be filled fully autonomously. Samplers in the silo supply line are standard today for comparing the quality of the delivered flour with the contractually agreed parameters in the in-house laboratory and to fine-tune the recipes accordingly. Information about quantity and type is passed immediately to goods-in where the data is updated in production management. The silos for the main components are positioned on the roof of the building so that they do not take up any space in production. In addition to the flour there is also an external silo for salt. The remaining raw materials are delivered via goods-in. Once again the individual products are tested and recorded as regards their quality and quantity and transferred upon the relevant request from the raw materials store into the production process. Here the FIFO (first-in-first-out) principle is implemented. A relevant storage plan is taken into account in

advance for each item, whether a dry component or a liquid, and which then forms the basis for automated dosage. In this process container sizes are adapted to planned consumption quantities. One specific challenge here was the forward planning of the system. The individual construction phases were integrated into the overall planning, taking the planned final expansion stage into consideration. The maximum total output of the plant has not yet been achieved. Through the pre-planning of the time-staggered implementation of the individual construction phases, the individual baking lines have been built and commissioned gradually. Bakery lines have all been loaded with Zeppelin's continuous kneading system Codas. The kneading systems are adapted to the necessary dough output and dough quality.

Weighing and dosage

In accordance with the production planning there is recipe-controlled weighing, transportation and dosage of the liquid or



Photo: Zeppelin Systems



Photo: Zeppelin Systems



Photo: Zep

Left photo: Zeppelin Systems also delivered the system for using hot and cold soaked grains in production. Middle photo: Fermentation processes are controlled via the batch management system Prisma Web2. Right photo: In addition to mains water more and more ingredients in liquid form are fed in such as yeast and salt.

powder-form components for the line-assigned Codos continuous kneading systems. Cross-contaminations of the baking ingredients are excluded due to the system configurations selected. The flours and baking ingredients are weighed in central weighing stations. Every weighing device has an assigned subsequent container into which the weighed load is immediately fed with a big discharge rate so that the next weighing process can start immediately. This is now a common process for increasing plant output. Consumption quantities for the individual recipe components are precisely recorded and logged so that subsequent tracking of the individual batches is always guaranteed. In addition to the high degree of automation of the storage and transportation of the powder-form baking ingredients, the system concept also integrates the processing of liquid yeast, saturated saline solution and the automated production of starter doughs and hot and cold soaked grains. The use of starter doughs and sour doughs

with long-term fermentation is becoming increasingly important in the industrial production of bakery products. Water, flour, yeast and/or starter doughs are continuously fed in using a shear stream mixer and mixed until they are homogeneous. The shear stream mixer is a floor-standing, cylindrical feed container, conical underneath, in which the shear beams are locked. A shaft equipped with shear beams also rotates in the container. After mixing the sediment is pumped continuously into the fermentation container. Once the predetermined fermentation period has expired and when the maturation is complete, the dough is transported through a heat exchanger into a storage tank. Here the requisite storage temperature of the starter dough and sour dough is set via the temperature control in the heat exchanger. Liquid yeast is delivered by tank lorry, stored cooled in storage tanks, transported via a circular pipe and continuously fed into the kneading systems in accordance with the specific recipe.

Kneading

The weighed batch consisting of flour and bakery ingredients is transported in a pre-mixer of the Codos system. A homogeneous blend is generated very quickly in the mixer by means of three-dimensional mixing. This is then emptied into the differential weigh feeder. The weigh feeder guides the dry mixture gravimetrically to the mixer of the Codos system. In parallel all liquid components are fed in. After the mixing phase the dough in the kneading phase is passed to the Codos system. The dough is then kneaded here based on the required qualities. The kneading process is adjusted to the requirements of further dough processing in addition to changeable revolutions and through different tooling shapes. Kneaders and mixers can be designed double-walled. This enables the dough temperature to be influenced significantly. The continuous mixing and kneading system delivers in constant operation consistent dough qualities with constant temperatures.



Photo: Zeppelin Systems



Photo: Zeppelin Systems



Photo: Zeppelin Systems

Left photo: The stationary cleaning system is installed based on the „lost cleaning“ process, where the cleaning agent is only used once and then disposed of. Middle photo: The short kneading times and the low strain of the dough in the kneader enable a good control of dough temperatures. Right photo: The dough moves from the Codos mixer into the Codos kneader and the residue dough feed can also be integrated into the process.

Depending on the requirements of the different transfer points, the residue dough which accumulates during dough processing, is picked up again. Through its batch management system Prisma Web2, Zeppelin Systems controls all process steps up until the dough is handed over by the Codos-System to the dough processing machines. This modern control technology comprises, amongst other aspects, produc-

tion control, recipe planning and batch traceability. The delivery scope of the total system includes a computer-controlled cleaning system for pipes and containers. The ongoing further development of these cleaning systems and their integration not only into industrial system technology is one of the main tasks which Zeppelin systems sees as its main focus in future developments. Overall it has been

possible to execute the complete project in a very short timeframe through the early incorporation of all supplier companies into the construction planning. The award of larger projects to one company, such as here from raw material acceptance to dough processing, to Zeppelin Systems, also avoids any interface problems, a factor not to be underestimated in the commissioning of big bakery lines.

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