Fully integrated solution

Process control system for the smooth integration of all sections of a Kerry breadcrumb production plant

The Plant iT process control system has finally allowed the successful integration of the individual process plants of the Kerry breadcrumb production into one single operating and control system. The universal controller, with its dynamic recipe adjustment and ultra-modern residue monitoring function, provides the foundation for an increase in productivity as well as significant quality improvements.

As one of the most renowned companies in its sector, Kerry is not only a developer, manufacturer and marketer of food products, but also one of the world's leading providers of food ingredients and flavor additives. Among the more than 10,000 different products the company is selling in 140 countries are breadcrumb products prepared according to over 100 different recipes.

Optimized process sequences for enhanced productivity

The process control system of one of Kerry Ingredients' major breadcrumb production plants in the outskirts of Berlin has recently been modernized with the objective of increasing its productivity through optimized process sequences. In order to achieve this ambitious goal, all the plant sections provided by different manufacturers for individual process steps had to be integrated into a consistent process control system. These include the receipt of raw materials, the production of the liquid pre-mix and also some manual components in a batch procedure. Furthermore, the provision of material from silos and the addition of the correct quantity of solids, such as flour and other powdery ingredients, to this liquid pre-mix in a Konti kneader, strictly according to the individual recipe, must be controlled with the utmost precision. Via a portioner, the prepared dough is fed into the continuous process section up to the tunnel furnace. After the baking process, the bread is ground, dried and sieved, and the finished breadcrumbs are packed. A consistent automation and control solution, including

- the receipt of raw material,
- batch procedures of the liquids and solids plant and
- the continuous dosing of liquid and solid components in the kneader and even
- the portioner,

is a major prerequisite for optimized process sequences and the smooth combination of batch procedures with continuous procedures for increasing productivity and ensuring batch traceability. Kerry decided in favor of the Plant iT process control system equipped with the Batch iT module specifically designed for recipe-controlled batch processes. In addition to the Batch iT module for efficient recipe and order management, this process control system with its open architecture includes:

- the Plant Acquis iT production data management system,
- the parameterizeable interface to the ERP software, such as SAP R/3 or Charisma,
- the Plant Direct iT process control system,
- the technology-oriented Plant Liqu iT recipe control system and additional MES functions independent of the individual process steps (Manufacturing Execution System) in Plant Trace iT.

This process control system is the result of more than 25 years of experience in the field of software development. All system modules provide a centralized engineering environment with a shared database and a consistent user interface for parameterization.

Solid and liquid components automated in one system

The following three features of this process control system were major criteria for Kerry deciding in favor of Batch iT:

- The modular system architecture unites the recipe control of liquid ingredients and dry substances,
- materials management with batch tracking as an integral part of the solution and
- the use of standard hardware components of different manufacturers in an open system.

Batch iT now controls all central process steps of the discontinuous process section. Plant, process and recipe modeling is either performed strictly in accordance with ISA S88 or based on simplified models derived from this standard. Combined with process descriptions, the processing of parts lists – which can also be exchanged with external systems – simplifies the processing of a large number of different recipes. The complete logging of order and batch data provides security in regard to any obligation to produce evidence.

Dynamic recipe adjustment

Since in the Kerry breadcrumb production plants the liquid pre-mix is prepared first and solid components are added in a second process step, two recipe parts lists – i.e. one for the liquid and a second one for the solid components – are stored in Batch iT for each one of the numerous breadcrumb products. The liquid pre-mix therefore serves as a master system for process control: Based on the quantities of liquid actually

INFO

Company:	Kerry Ingredients GmbH
Sector:	Food
Location:	Heiligengrabe
Country:	Germany

added, Batch iT generates the orders with the corresponding quantity of solid components in real time.

Depending on the total quantity of solid material to be added to the liquid pre-mix for an individual batch within a defined period, the process control system calculates a setpoint characteristic for the control of the screw conveyor speed of the differential dosing scales. With the mass transfer control optimized in this manner, the process control system only has to compensate deviations in the actual value to the calculated setpoint curve. This intelligent approach results in a jump in quality in dough production because the dosing of solid components is calculated in advance for the entire dosing period.

During the dosing and kneading process, the process control system continually checks how much liquid has been processed with which solid ingredient and how much solid residue material is still available or required. By means of this residue monitoring function, the system adjusts the calculated quantity of flour to the quantity actually required. In addition, the plant operator has the option of performing manual corrections by adjusting the component ratios in the process image during the runtime of an order. This allows the operator to adjust the dough consistency according to his experience during operation in order to compensate variations in quality and the properties of the various natural raw materials. The residue quantity monitoring function of Batch iT considers all operator interventions until the completion of an order and logs them accordingly.

Higher productivity

The interconnection of the automated plant sections with Batch iT and the dynamic adjustments of recipe ingredients are key factors in achieving a significant increase in a plant's productivity. Furthermore, the Batch iT process control system has contributed towards quality improvements because it allows plant operators to respond immediately to varying dough consistencies. The positive experiences with Batch iT were a major reason for Kerry to use this process control system as a factory standard for other European breadcrumb production locations. In the meantime, a second plant in Europe has been automated based on additional production data acquisition for package units in the continuous process section. The commissioning of a third plant in Germany is in full swing.

For the production of its breadcrumb products, Kerry has decided in favor of the Plant iT process control system equipped with the Batch iT module specifically designed for recipe-controlled batch processes.

KEY DECISION CRITERIA

For users

- The process control system of one of Kerry Ingredients' major plants has been modernized with the objective of increasing its productivity through optimized process sequences.
- For this purpose, all plant sections must be integrated into a consistent process control system.
- In addition to the Batch iT module for efficient recipe and order management, the Plant iT process control system, based on an open architecture, includes the Plant Acquis iT production data management system, the parameterizeable interface to the ERP software, such as SAP R/3 or Charisma, the Plant Direct iT process control system, the technology-oriented Plant Liquid iT recipe control system and additional MES functions independent of the process steps (Manufacturing Execution System) in Plant Trace iT.
- The interconnection of the automated plant sections with Batch iT and the dynamic adjustments of recipe ingredients are key factors in achieving a significant increase in the plant's productivity.