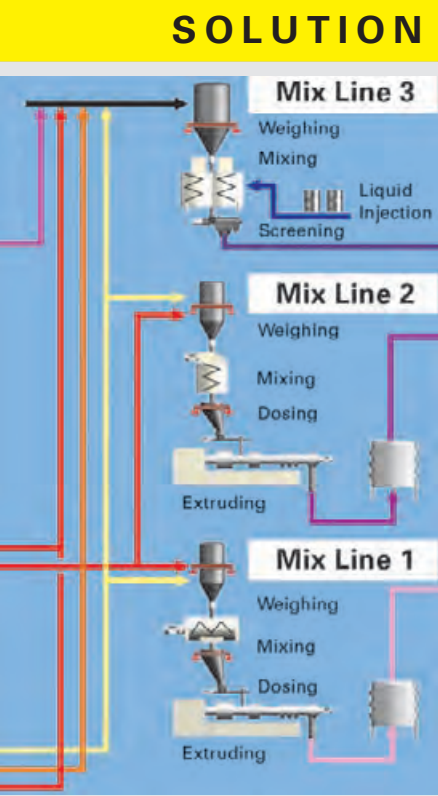


Automated Mixer Feeding for Pre-Mixes and Specialty Ingredients: Ready for the future





Ingredient systems
for the baking industry

Concept with maximum flexibility and future security: A case study of mixer feeding systems from the market leader

»Today, technology innovations require speciality ingredients based on our natural raw materials for the food industry. We were looking for a business partner who could provide us with state-of-the-art technology and process IT, one who could offer us flexibility and long term future security, which were needed for our production processes. One who would assist us with an experienced person on site and who would fit in with our integrated approach to quality philosophy.«



The Customer **KAMPFFMEYER**

KAMPFFMEYER Food Innovation GmbH is a joint venture between Europe's largest mill group – VK Mühlen AG, Hamburg, and one of the world's leading producers of emulsifiers and unique ingredients, PALSGAARD A/S from Denmark. KAMPFFMEYER Food Innovation GmbH is a company within the KAMPFFMEYER Group and specializes in the refinement of raw vegetables. It is a European leader in the development, production and marketing of innovative ingredients, compounds and ready-to-use blends (pre-mixes).

In addition to functional flours; customized compounds, textured proteins and functional food products are produced for the baking industry such as OMEGA-3 bread®, GLYX bread®, CULT rolls® etc. at the newly built plant in Hamburg.

Currently, cereal products are refined by means of cold spraying crystallisation or a variety of mixing technology. KAMPFFMEYER Food Innovation GmbH also develops unique ingredients and concepts for top consumer brands from the KAMPFFMEYER Group, such as Aurora® and Müller's Mühle®.

In the future, new products will include baking additives and ingredients, expanded cereals, fat powders, function food (nutrient concentrates for the baking and food industries), functional milled grain products, grain specialities, health ingredients, organically grown products such as lecithin compounds, special flours/concentrates, standard milled grain products, flour-based texturizing and binding systems "PURAFAFIN®" and other ingredients.



Cereal protein coating for the bakery industry



»Our objective is to plan an overall process without adding to our existing engineering capacities and implement the project in phases to prepare us for future production«

Karl Heinz Driller, Managing Director
KAMPPFMEYER Food Innovation GmbH

Task definition

- Plan the complete production plant as a graduated concept including the areas of packaging, filling, extruding, mixing, drying, grinding, screening and the automated handling of bulk and liquid ingredients.
- Include all control systems for the plant in a central location and integrate the existing plant areas:
 - manage and update master and production data
 - process production jobs
 - control automatic and manual weighing machines
 - identify ingredients by computer assisted systems
 - identify intermediate products and weighing operations throughout the entire process
 - monitor weighing processes and document all exceptions
 - perform all documentation and reporting processes
 - exchange data with customer host (AS400)

Requirements

- Fully automated process chain: integrate all value-added chains from ingredient delivery to silo/bin filling, and mixing, drying, extruding, screening and grinding; reduce manual intervention to a minimum
- Seamless batch tracking in compliance with EU Directive 178
- Flexibility: Produce batches of up to 20 ingredients quickly without any major cleaning at product change; freely select the type of filling receptacle: bags, big bags or tankers; automatically feeding the in-house produced refined cereal products via silos to the mixer line
- Clear line allocation for mixing and extrusion lines

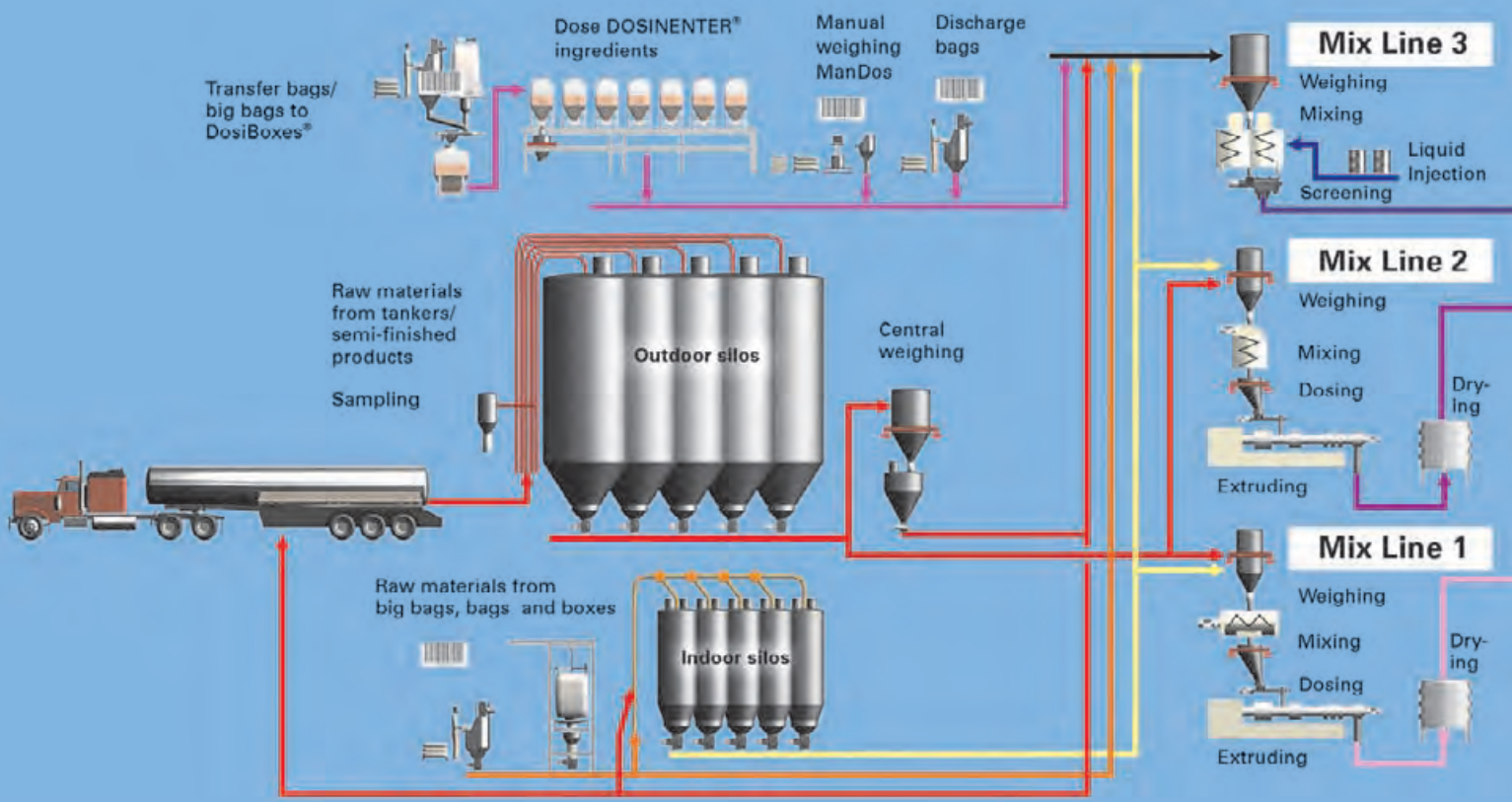
Cost Savings

- Increase profitability
- Optimise product quality
- Reduce production costs



PURAFIN®, the flour thickening system





The AZO solution: Intelligent process control

Feeding three lines

The fully automated plant from KAMPPFMEYER Food Innovation GmbH feeds a high-performance mixer, two single-shaft mixers and the succeeding extrusion lines. The mixtures are conveyed via all metal separators and screening machines to big bag and bag filling equipment. The process then continues via a dryer, grinder and screener to the finished product

silos, and then to the all-metal separators/screeners. The final mixes are filled in bags or big bags. In addition, both the high-performance mixer line and the extrusion mixer line can feed tankers.

Bulk Ingredients delivered by tanker

For bulk ingredients, aluminum outdoor silos are used, each with a diameter of 3500 mm and a capacity of 108 cubic meters. The silos for cereal starches and granulated sugars are equipped with pressure relief fittings. This is not necessary with final products and flours. All external silos are loaded by a central coupling station. A sample is automatically

taken from all delivered materials and analyzed in the on-site laboratory. Only when the results show that the delivered raw materials meet the specifications, they are released to production. All silos are equipped with a dryer to prevent the formation of condensation. The products are transported by dependable vibrating bottom dischargers and rotary feeders.



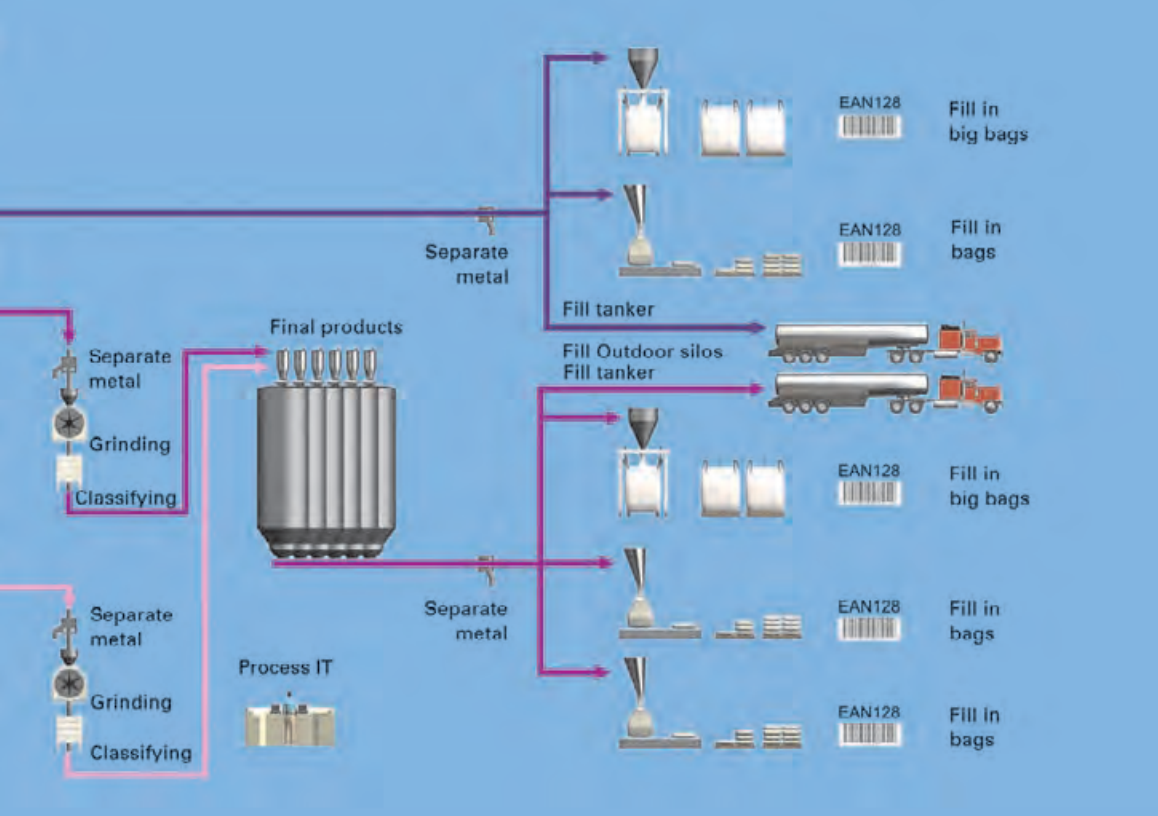
Outdoor silos



Side mounted pressure relief



Silo drying capability



»By combining vibration bottom dischargers with an AZO vacuum conveyor, we achieve clean silo frame skirts.«

Günter Ellmann, General Manager
Production & Engineering
KAMPPFMEYER Food Innovation GmbH

Vacuum weighing systems – ideal for large ingredients

From the flour silos, the product can be transported to the central scales or to the scales via the extrusion lines. The product is distributed by means of a diverter. The cleanliness of the frame skirts is proof that the vacuum conveying system is the ideal way to transport ingredients in pneumatic conveying systems. Large quantities are transported

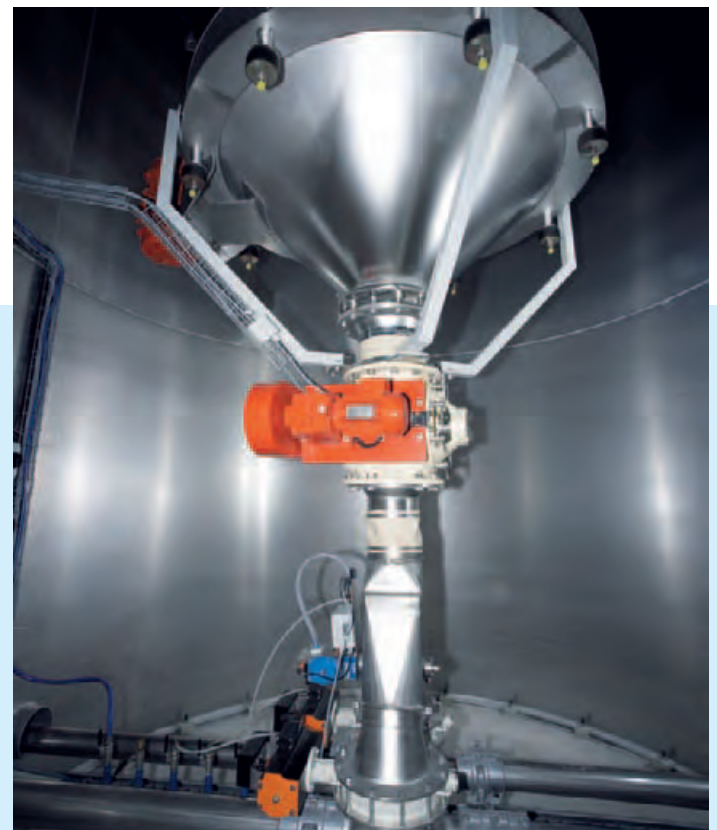
to a central weighing station. This allows the conveyor scales to prepare the recipe automatically via a vacuum weighing system. When the batch is complete, it is discharged to a vessel and transported to the large conveyor scales via the high-performance precision mixer. To achieve the greatest possible flexibility in the production process, raw material

silos can also be filled with

they are conveyed to the next refinement process.



Sampling on delivery



Discharged into the vacuum weighing system



Dust-proof docking and discharge

Extremely flexible ingredient dosing

Raw material delivery in bags

A feeding hopper is provided to discharge ingredients from bags that are difficult to convey or contain highly fatty products. When the operator opens the lid, an aspiration system transfers powder products to the closed systems for a dust-free environment. A barcode reader on the feeding hopper ensures that the specified ingredients in the recipe are discharged. At the material supply level, conveyor scales can be charged in free fall from feeding hoppers with products

that are difficult to convey. They are then transferred to the extrusion lines.

Automated bag discharge

The bag discharge equipment is fully automated and opens precisely coded raw material batches and discharges the bags. The product is then transported via a pneumatic pressure conveying system fitted with a barcode monitor and stored in indoor silos. For this purpose, the bags are picked from the storage

area, placed on a conveyor upstream of the bag discharge machine and recorded by barcode. With the help of the automated bag discharge equipment, both the indoor silos and the three mixer lines can be fed by pneumatic conveying systems.

Raw material delivery in big bags

The big bags are delivered from the high rack storage area, docked in a dust-proof area on the big bag discharge station, and conveyed

through the pneumatic conveying system to the indoor silos. In addition, the three mixer line scales can be fed from the big bags and the silos: extreme flexibility is also the key factor in big bag handling!

Indoor Silo Storage

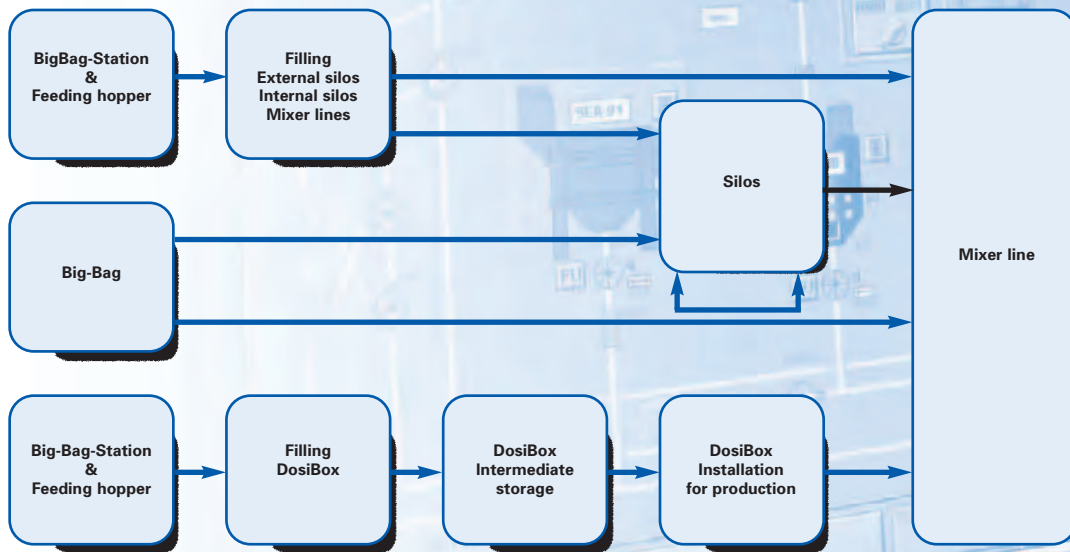
Raw materials are stored in indoor silos and filled pneumatically for the purpose of automated access.



Feeding hopper for discharging bags into the closed system



Storage in internal silos



Combined product discharge – extremely flexible

»Within ten minutes we had all the data from the raw materials to the final product. That is accurate and dependable batch tracking.«

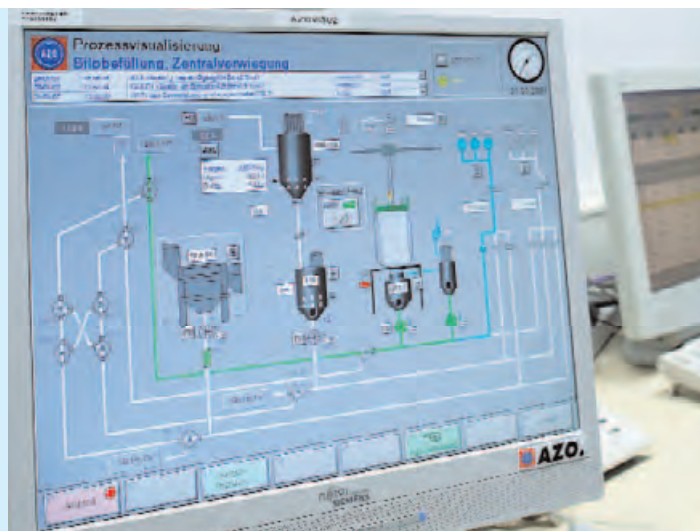
Accurate Batch tracking

KASTOR, the integrated process control system linked to an AS 400, guarantees reliable product tracking from ingredient discharge to the finished product. This can be achieved by barcode identification, e.g. barcode type EAN128:

- Product labels with plaintext and barcode ID are generated at customer's material income.
- Barcode data is separated into several partial barcodes in accordance with the EAN128 Standard.

In addition to barcode identification, another security is the direct data exchange with the host system via a database interface. This allows reliable ingredient identification with real-time verification and release to production.

In addition, the general conditions are retrieved continuously, e.g. minimum shelf life, article allocation and batch status.



Process control system



»With the operator-guided weighing stations, we are sure that even very small quantities are batched, weighed and documented without error and with a high degree of accuracy.«



Fully automated weighing with the DOSINENTER® for minor or micro ingredients

Unique requirements – unique solutions

The DosiBox® – efficient automation of frequently used, small quantities

A DOSINENTER® system is available for minor or micro ingredients, e.g. salts, that are accessed frequently. The DosiBoxes® are discharged from bags or big bags in production planning and provided with barcodes. These ingredients can then be supplied to the mixer line automatically and weighed to the exact gram.

ManDos station: dosing very small quantities without error and with high precision

Very small ingredients are fed into an operator-guided system by the computer-assisted ManDos dosing station. Two different processes can be applied here:

Preproduction – setting the premixer

- Preproduction for the mixing line
- Preparing a mixture consisting of manual additions (barcode identification via external system)
- Data exchange with external system, feedback with output data to the AS400
- Intermediate storage in a premix silo

Preproduction – manual weighing

- Preproduction for the mixer line
- Weighing small quantities on a scale
- Identifying raw materials by barcode (EAN128)
- Storing weighing data including batch numbers, assign mixing job



Transfer from bags and big bags to DosiBoxes



Operator-guided weighing of very small quantities using ManDos



Discharge bags into a feeding hopper



Production overview

IT Process: Networking all added-value processes

Accuracy from raw materials to packaging

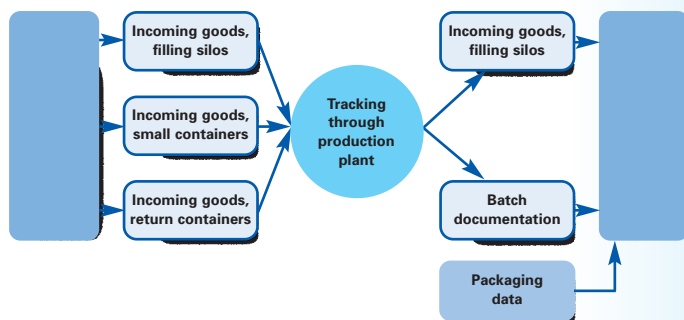
The process IT of the AZO subsidiary hsh-systems for process IT controls and documents the entire added value process and provides accurate tracking from raw material to packaging. All production areas are viewed in Intouch, so that the customer has an overview of the entire process at all times. The displays of material and data flows and the continuous availability of key real-time data allow operators and managers to make quick decisions and take the correct action in critical situations. One requirement is the seamless integration of actuators and sensors via the control and instrumentation level to the higher-level ERP system

Kastor – batch-based process control system for automated feeding systems

By combining the innovative Kastor process control system with a visualisation system based on standard tools, the result is a central process control and visualisation system that permits several workflow controls and checks. This central system also provides the seamless documentation of production processes (active factory), e.g. batch logs, efficiency calculations and a long-term archive for all the data collected. It guarantees customized access control, system security and validation capability in accordance with GAMP 4 and FDA regulations. The process control system also has a master data management system that is based on the specifications of the S88 specifications. Kastor is also connected to the high-level customer system (AS400) to store recipe and order data.

Other features of Kastor:

- Recording raw materials, deliveries, storage, storage removal, filling, transferring, identifying (read, write, barcode capability (39, 128, EAN), RFID, PDA and WLAN capability.
- Info points with display of production states (job progress), alarms, required action, e.g. silo refilling due to shortage of materials, truck loading and unloading operations, etc.
- Transfer to packaging machines.
- Filling and discharging big bags, containers, pallets etc. (return containers, identifying/labelling with barcode (39, 128, EAN), transponders, RFID).
- Multistage production processes with tracking of raw materials, order and batch overlaps.
- Combinable with concurrent and noncurrent manual weighing.
- Calculating active ingredients, water content and production factors.
- Handling scale tolerances by selection dependent on order recipe specifications, ingredient specifications or scale parameters and weighing ranges.
- Cleaning inspection.



Data flow tracking



Feeding a horizontal mixer above cooking extruder

Vacuum weighing systems for dust-free feeding of mixing and extrusion lines:

Central weighing: maximum capacity with greatest possible flexibility

The central weighing system provides a flexible, high volume bridge to span long conveying routes. All raw materials can be transported on each of the three mixer lines and each mixture can be filled in any required packaging form.

AZO dosing and weighing systems: a precise solution

All scales in the KAMPPFFMEYER plant are capable of transporting by vacuum or pressure conveying. Over 20 ingredients can be transported in the conveyor scales via the high-performance mixer in mix line 3. An automated weighing process with coarse/fine dosing system helps to achieve accurate weighing and dosing at very high

conveying speeds. In addition, fats and liquids can be added to the mixing process via a special liquid preparation system. The conveyor scales in mix lines 1 and 2 help to feed differential dosing scales that feed the cooking extruders. It is also possible to feed liquid ingredients to the extrusion process after precision weighing.

AZO dosing and weighing systems ensure that all ingredients feeding the mixing and extrusion process are precisely weighed and documented. All processes and functions in the mixing and extrusion lines are integrated in the central control system.



Central weighing system



Feeding a single-shaft mixer



Continuous batching



Automatic feeding of grinding processes

Integration of all added value phases into the closed automatic process

Special conveying system to dryer

A totally new type of special conveying system is used to feed highly sensitive materials to the drying process by means of a pneumatic conveying system. An innovative principle applied in the separator creates a pressureless state where the extrudates are separated with extreme care and fed to the drying process.

The grinding process

In the grinding section, a multiple system is used for dry grinding. It includes a very fine grinding machine for grains under 50 µm and produces granulate up to 2.5 mm in closely tolerated grain bandwidths. To feed the mills, gentle AZO vacuum conveying systems ensure that the mills receive a consistent product flow.

Value added – screening

Screens are fed after the grinding process. They separate the product precisely into coarse and fine materials, which are conveyed pneumatically to the final product and semifinished product silos.

Filling indoor silos by vacuum conveying

Vacuum conveying systems are used to convey the screened products to the final product and semifinished product silos. Before delivery to the filling process, the ingredients are safety screened and separated as a precaution.



Ingredient screening and separation



Intermediate storage in indoor silos



Fully automated metal separation

»Open bulk materials handling is a thing of the past. We now benefit from dust-free mixer feeding and clean separation between the various stories.«

Safety screening and metal separation of product prior to filling bags, big bags and tankers

Safety screening and metal separation

All final products and semifinished products from all production lines are fed through highly efficient and highly sensitive screeners before they are filled in bags, big bags, tankers or silos as semifinished products. The networked process control system displays information and documents the inspection points in real time in the HACCP concept from KAMPPFMEYER.

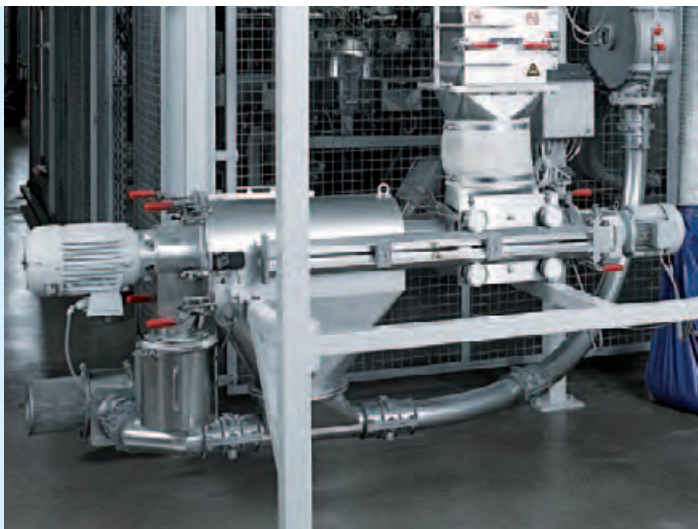
Filling bags and big bags

The final products coming from the individual production lines can be handled by a fully automated bag filling system. It also labels and prints the bags prior to placing them on pallets. The subsequent multiline palletising system, which is also fully automated, meets the top customer and transportation requirements. After the palletising section, each pallet is automatically provided with a unique EAN 128

code. The fully automated tracking system provides full visibility and rapid retrieval. The EAN identification system is also connected to the big bag filling machine on each line.

Feeding tankers

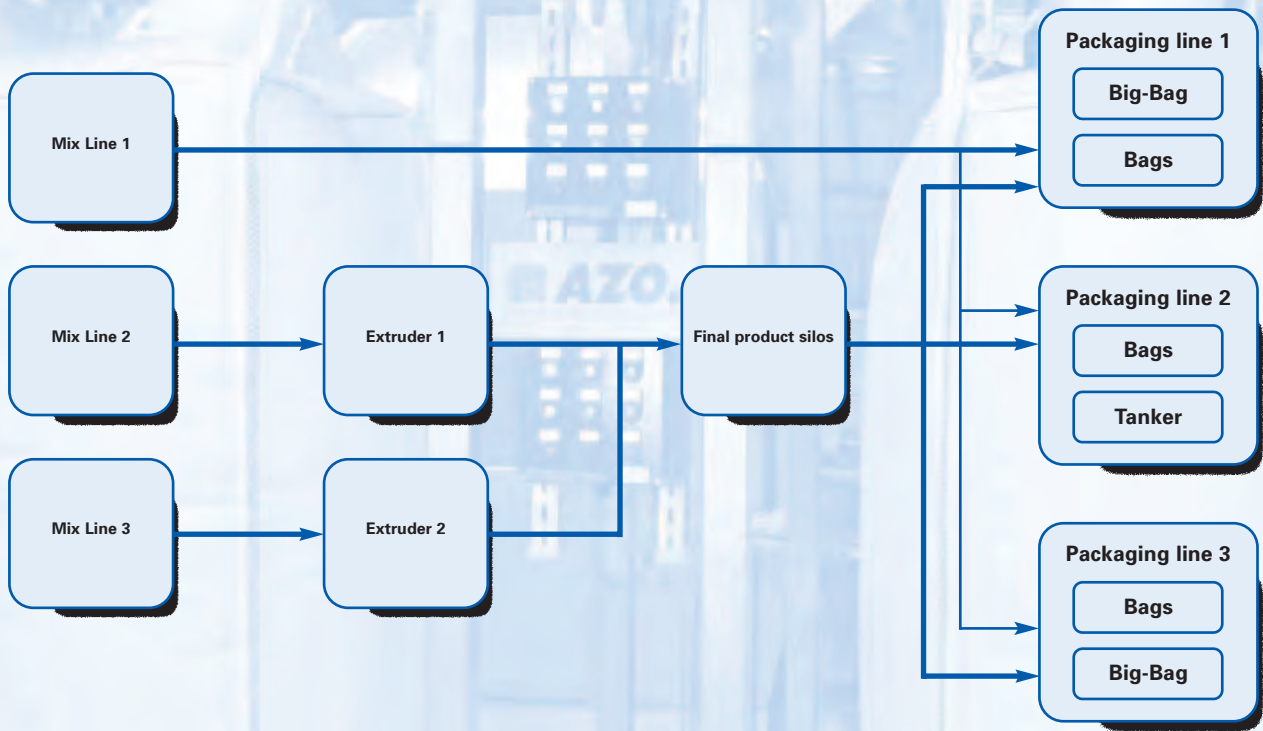
A high pressure conveying system is used to feed tankers or outdoor silos with final products and semifinished products. The conveying system ensures the greatest possible flexibility. These processes are also documented in the automated tracking system.



Safety Screening to meet HACCP standards



Automatic big-bag feeding with precise accuracy



Packaging flow diagram

Flexible and future-proof The control concept

Packaging control

The packaging control system transfers the packaging order data, e.g. order number and order description, to the packaging lines. The system then sends information to the AS400 comprising batch data, the number of containers, and the status of the packaging job.

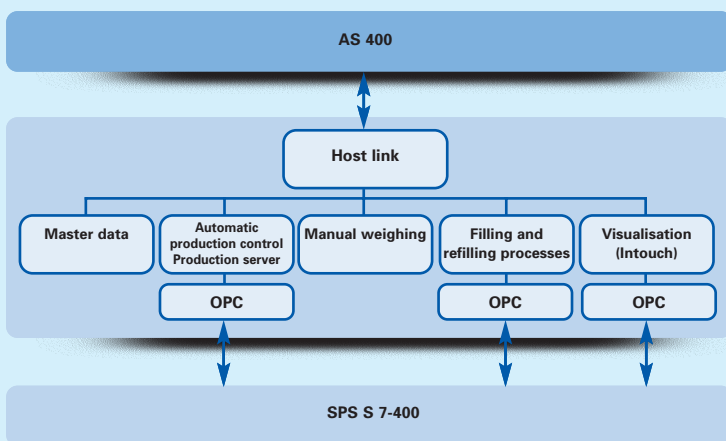
Connection to various control systems

Various control systems are linked via Ethernet in case of large data volumes, e.g. order data and packaging jobs. Profibus is used for low data volumes, status and control data. Only dry contacts are fitted for status and control data. Of course, commercially available systems are used for the entire control system in the plant.

Integrated overall control concept

The overall control concept is optimally matched to customer requirements for flexibility and process accuracy:

- Interfaces are easy to adapt to new requirements.
- The plant is easily expandable.
- Seamless tracking of raw materials throughout the entire plant.
- Subsystems are integratable to form an overall system.
- Data reception and return to the production planning and stock management system.
- Continuous expansion to the present solution.



Plant overview of control components



Process control and visualisation system



Conclusion:

»The technical consultation was excellent – both from the AZO field engineers on site and with our contacts at AZO. This was the only intelligent way to link and integrate all the added value chains to the interfaces. The production processes in our company became increasingly clear for customers, employees and our corporate management. Optimal communication during the installation phase between the project engineers at AZO and KAMPFFMEYER Food Innovation resulted in timely completion of the project. The problems that always crop up with such an enormous investment were discussed jointly and practical solutions were found. We are proud of the design quality and functionality of the AZO system and we are positive that we found the right partners to secure and direct future.«

Günter Ellmann (General Manager – Production & Engineering) and
Karl Heinz Driller (Managing Director),
our contacts at KAMPFFMEYER Food Innovation in Hamburg

AZO GmbH + Co. KG
D-74706 Osterburken
Tel. +49 6291 92-0
Fax +49 6291 92-9500
info@azo.de, www.azo.de


Right to the point.