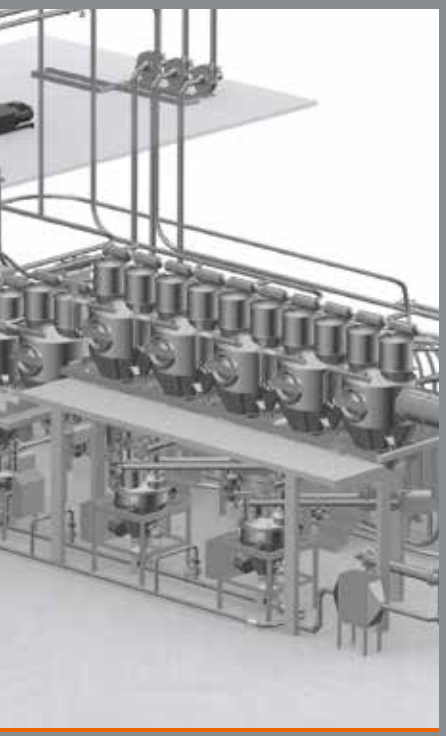
Automated production of baby milk powder in China in accordance with GMP specifications

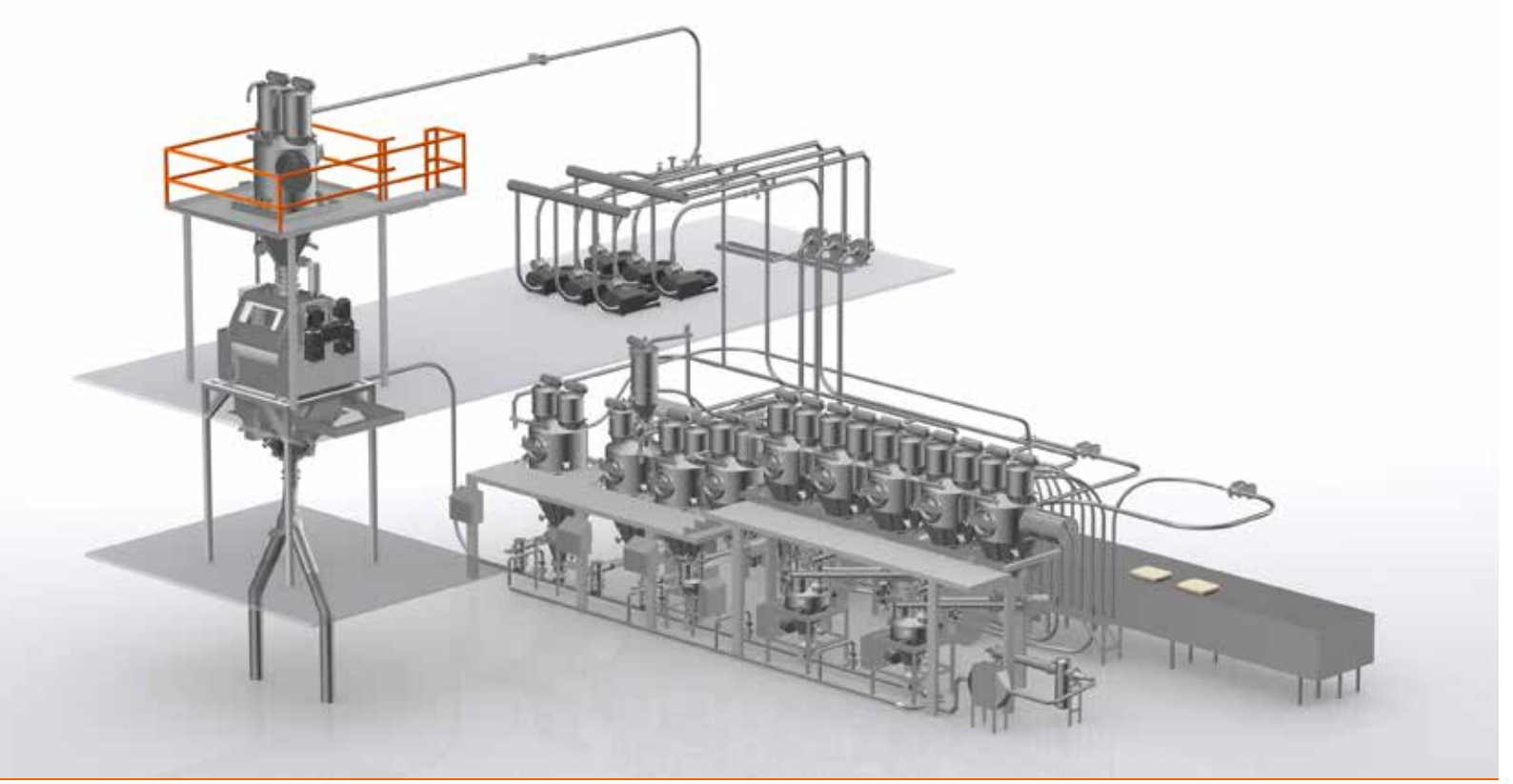
Maximum process transparency, continuous batch traceability

THE SOLUTION



We Love Ingredients.

AZO®



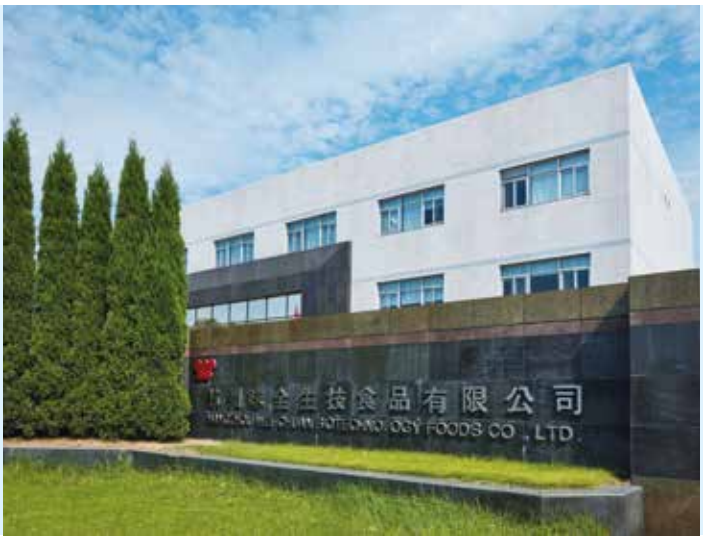
Automated plant for manufacturing baby milk powder

Automated dry goods handling from AZO
for safe production of baby milk powder

The customer

Wei Chuan Milk Powder was founded in Taiwan in 1953 to develop and produce baby food and baby milk powder in particular. Wei Chuan Hangzhou is the Wei Chuan Group's only factory for baby milk powder on the Chinese mainland and was built in 1992.

China has issued new regulations in order to guarantee the quality of baby milk powder. They impose considerably stricter requirements for issuing production licences. Accordingly, Chinese manufacturers of baby milk powder must ensure their production adheres strictly to GMP (good manufacturing practice). The new regulations clearly specify the conditions for the production process and the equipment in plants for the manufacture of baby milk powder. Wei Chuan Milk Powder turned to AZO to find solutions so they could comply with these conditions. AZO's plants make it possible for the Chinese manufacturers to stay in business.



Hangzhou Wei Chuan Biotechnology Foods Co. LTD, China

Mr. Wen is Factory Director at Wei Chuan Hangzhou

Investment objectives

1. The plant must satisfy all the provisions in the new statutory regulations
2. Closed production plant with minimum generation of dust
3. Fully automated production process
4. Precise weighing of all components
5. Ensuring production capacity of over 2000 kg/hour
6. Complete documentation and batch tracking
7. Maximum process transparency
8. Installation in existing production building

The Requirements

The old plant is to be replaced by a new one that satisfies all the requirements from the new statutory regulations. It was crucial to have 100% reliable tracking & tracing, high product quality and adherence to the stringent hygiene requirements. A particular challenge was the need to design the plant in such a way that it could be installed in the existing production building and simultaneously met the required production capacity.

The requirements in detail:

- high level of process reliability
- high degree of automation
- consistent product quality
- maximum process transparency
- complete documentation and batch tracking

Clean production plant that complies with all statutory requirements and ATEX guidelines

Reliable feeding of the mixer via a vacuum weighing system with conveying scale

»The new AZO plant complies with the statutory regulations in their entirety: closed systems with minimum dust, precise weighing of components, product safety thanks to integrated screening systems and extremely easy-to-clean systems were behind the successful awarding of the production licence for baby milk powder to the Wei Chuan Hangzhou factory«

Jianyu Wang
General Manager AZO China

After manual feeding of products, the following process runs automatically

Reliable mixer feeding at high throughput rates

thanks to automation of bulk and minor quantities

AZO's solution in detail

The heart of the plant consists of a new 1000-litre mixer that is fed via a closed material feeding plant, generating a minimum of dust. The specified plant capacity is achieved with a throughput rate of five 400 kg batches an hour, and the mixing quality satisfies both the high demands of the customer and all statutory regulations as well. Nine different bulk and medium-size components are supplied over three feeding hoppers into the closed conveying system. A screener below each feeding hopper ensures that no foreign matter or contaminants enter production. In order to rule out mix-ups of materials, each component is marked with a barcode. Once the machine operator has scanned the barcode and release has been approved, the product is conveyed into the corresponding buffer hopper via a pneumatic vacuum conveying system.

There, level indicators ensure that the machine operator replenishes the required product in good time. The conveying air is prepared using a dryer so that the quality of the raw materials is not impaired by any moisture.

One line was designed for the bulk component A in such a way that it is possible to meter from the buffer hopper at the same time as this is being filled. This helps achieve the required, high throughput. Where maltodextrin is concerned, the challenge lies in the product properties, which require constructive explosion protection. Rupture discs are installed at the buffer hopper and conveying scales for this purpose.

The production jobs with the various recipes are sent to AZO's Kastor process control system from the higher-level ERP system in order to start production.

Product feeding with monitoring of barcodes

Continuous conveying of the bulk component A into the buffer hopper

The components are metered from the buffer hoppers into the vacuum weighing system

Closed pneumatic conveying systems ensure production with a minimum of dust

Kastor makes it possible to provide the right raw materials according to the recipe in the precise quantity and at the right position.

The bulk components are transported and weighed using a vacuum weighing system. The conveying scale, which has a volume of 1000 litres, are situated above the mixer. Using partial vacuum, the components are sucked successively into the conveying scales and weighed at the same time. Minor quantities are also fed as bagged goods via a feeding hopper. In order to comply with the stipulated weight tolerances, a separate hopper scale is provided for these products. The pre-weighed batches are also sucked into the conveying scale.

Once all the components are on the scales in the exact quantity specified in the recipe, the entire batch is discharged into the mixer. When the baby milk powder has been mixed homogeneously, it is transported to a buffer bin.

After another control screening, the milk powder can be packed into sacks. Another batch can be prepared and mixed at the same time using the materials handling system.

Accurate weighing of minor quantities in hopper scales

Reliable feeding of the mixer via a vacuum weighing system

»It is especially important to handle raw materials that have been weighed manually at the same strict standards as automated raw materials with regard to operator prompting and batch tracing. It is precisely these materials that frequently have a crucial impact on the properties of end products.«

Hendrik Langner
Senior Engineer, AZO CONTROLS

The machine operator fills the pre-weighed and labelled batch into the feeding hopper

ManDos computer-aided manual weighing system:
Secure documentation and tracking of all micro quantities

Weighing and recording of micro quantities
The ManDos manual weighing system gives prompts to the operator for the required individual production steps. The operator is prompted to weigh the micro quantities needed for the recipe into a bag and to confirm this in the system. Once the batch has been assembled, the bag is provided with a barcode and transported pneumatically via a feeding funnel into the conveying scale. It is not possible to charge the bag at the feeding funnel unless the barcode matches the code requested by the control unit. This prevents mixups of materials and ensures that only the products required for each recipe enter the batch. This procedure allows recording and documentation of every component and weight, with the result that they can be traced back at any time.

Recording and labelling of the raw materials in the incoming goods area

ManDos computer-aided manual weighing system for precise weighing of micro quantities

»AZO's Kastor process control and instrumentation system monitors the entire process, from incoming goods through to feeding the mixer. Machine operators are given prompts – mistakes are prevented.«

Yancheng Wen,
Factory Director, WeiChuan

Central control room for controlling, operating and monitoring the plant and processes

Plant engineering and intelligent process IT

Bespoke solutions from a single source

Central process control and visualisation system for maximum process security
At the heart of the plant is a PLC that controls all the units. The entire production process is controlled, operated and monitored by the central process control system. This is where recipes are determined and production jobs are created. Security of the production process is ensured by relevant access permissions and user logins.

There are operating terminals in all key areas of production, where the operator is sent important information and can acknowledge individual production steps.

Starting with the entry of raw materials into the plant, security of the process is ensured by barcode monitoring. From this point on, the raw materials are tracked through the system; each automated movement of material is recorded. This ensures continuous tracking of batches of raw materials.

The intelligent process IT ensures that all components included in the recipe are processed in the right quantity, at the right time and at the right place and therefore guarantees constantly high product quality.
A protocol is generated for each automatic weighing procedure and each manual addition of ingredients. The mixing process takes place after this. Each batch is mixed homogeneously in accordance with the specifications of the process control system, thus achieving a high degree of adherence to recipes.

The system generates a batch protocol for the result of production. The batch data are saved in the system continuously and can be retrieved again at any time using the assessment and analysis functions on the control console.

Controls in the MCC room (motor control centre)

Operator terminal where raw materials are replenished

2010 1098 GB

Conclusion:

»AZO aspires to improve each part of the plant even more every day. For us this means: maximum plant safety, straightforward operation and simple cleaning«

Yancheng Wen, Factory Director, WeiChuan

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