



Fit for the future

Efficient material handling for the production of technical special thermoplastics and elastomers

High throughput

Minimum cleaning effort

Frequent formula changing

High formula accuracy

Optimum process planning

The requirements

As Bada produces only tailor-made products to meet customer requirements, the requirements for the new production system clearly orientated themselves to the specifications of the Bada customers: it must be possible to produce batches of between under 1,000 kg and 20,000 kg, with emphasis on the range between 2,000 and 4,000 kg, in a way which is economical, i.e. with a high throughput, high system availability and low cleaning requirements. Therefore, systems are required which are more or less identical in

construction and have an appropriate line structure. Key factors are the exchangeability and low capital tie-up for wear and spare parts, simple production planning and standardised plant operation by the employees in production. The compounding system, including its feed mechanism, must be suitable for a wide range of materials and ensure optimum compounding quality, high formula accuracy and an exact colour fidelity of the granulates ready for injection moulding, even if there is a change in the formula.

THE SOLUTION



"The AZO plant offers us the flexibility and process safety required to fulfill the high expectations of our customers. The new process IT from the AZO subsidiary hsh-systeme, gives us optimum planning and control of our production, so that we can reduce the cleaning required when changing formulas to an economical level."



The customer

Since the beginning of 1998, Bada AG has produced special compounds for a wide variety of different market sectors, including the automotive, electronics, sport and leisure, household goods and construction branches as well as for furniture manufacturers and the medical technology industry. Optimisation and an increase in the efficiency of process cycles were the main reasons for the new construction development at the company's site in Bühl (Baden, Germany). Bada, together with the Spanish company Bada

Hispanaplast, now generates an annual turnover of approximately 40 million euros. Work is carried out five days a week at the Bühl plant, with a three-shift operation. Bada ensures high quality standards through its quality management system in line with TS 16949:2002.

The company moved into its new site at the end of 2006. The site can be easily expanded and state-of-the-art process technology is on hand.

AZO SOLIDS Solution

Manufacture of special compounds - Overall concept

Starting situation and specifications

The basic plastics are technical synthetic materials, in particular different polyamides (PA 6, PA 66) including a high-temperature polyamide, thermoplastic elastomers, based on styrene block copolymers (SEBS, SBS), and polybutylene terephthalate PBT. The materials are to be reinforced, for example using glass or carbon fibres, to be filled (with chalk or talcum), dyed and, if necessary, also fitted with fire protection equipment. In addition, an expansion of the product portfolio was planned from the beginning to include ABS special

compounds and compounds of thermoplastic elastomers on a PP/EPDM basis. Starting with these requirements, all those involved in the process created and completed the project that has now been implemented.

In particular, three points were of key importance for Bada:

1. Flexibility

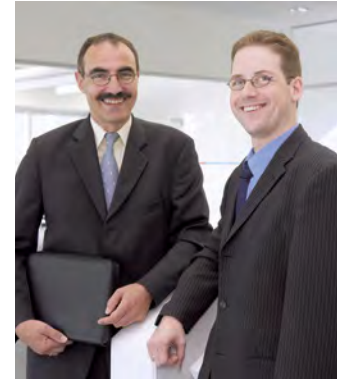
"We change formulas between 12 and 15 times per day, so the AZO loading systems must be easily accessible and easy to clean."

2. Process safety

"Several extrusion lines are dependent on the loading system. We cannot afford any failures and require very high availability."

3. Long-term investment security

"We required a universal plant system, which can be expanded flexibly and in a modular way, as we cannot yet know which special compounds we will be producing in five years and which raw materials will then be required."



Andreas Schettler
Managing Director

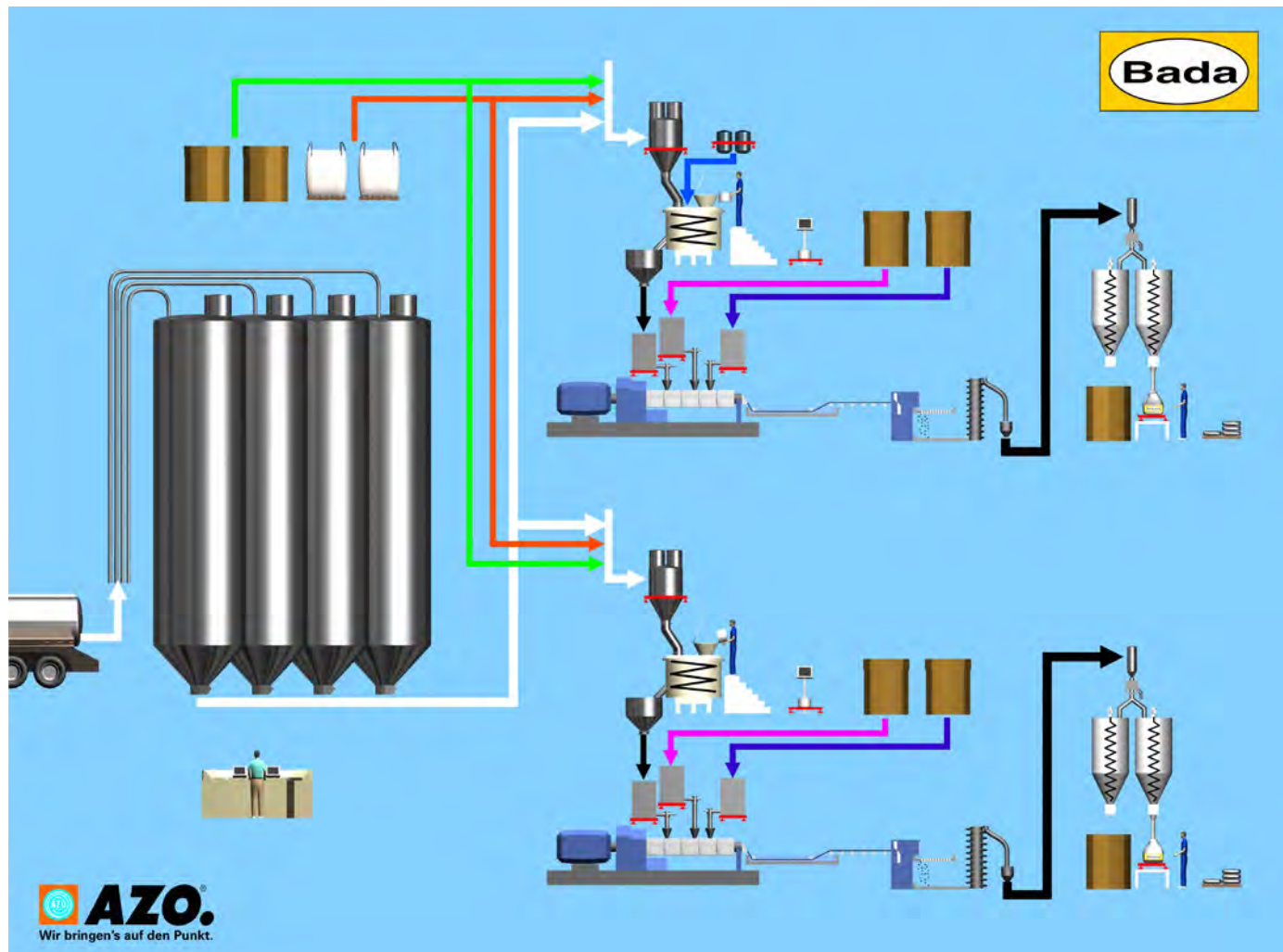
Markus Fiedler
Production Manager

The AZO solution

The AZO solution primarily consists of three different plant areas. The bulk volumes are available in outdoor silos together

with suction weighing systems. Medium-sized components are also transported to the mixer from Oktabins or big bags via the

suction weighing systems. User-guided ManDos weighing stations are available on each line for additives, dyes and aggregates.



High weighing and dosing accuracy in the automatic mixer feeding with major ingredients and medium-sized components

The aluminium outdoor silos for the feeding of the major ingredients, mainly PA of different qualities, have a diameter of 3,000 mm and each a volumetric capacity of 90 m³. These silos are equipped with a level measurement system and a silo hopper connector with suction nozzles is used for conveyance and suction. From here, the PA products are transferred to the individual mixing lines using pneumatic suction weighing systems. For this, the conveying scales of the suction weighing systems, equipped with electro-mechanical weighing systems, are

subjected to a vacuum created by underpressure generators. This sucks the granulate out of the outdoor silos, through the pipelines and the multiport valve, and into the conveying scales. The multiport valve makes conveyance of practically any product to any mixing line possible in a way which is extremely economical and low height. Just before reaching the target weight, a fresh air valve opens on the multiport valve, causing an exactly defined run-on to enter the conveying scales, thus providing very high weighing and dosing accuracy.



Storing of major ingredients in outdoor silos



Patented multiport valves transfer the raw materials right to the point



Liquid weighing systems



Vacuum weighing systems for major ingredients

Fully-automatic feeding of the medium-sized components

An additional option is to use this multiport valve to convey products from Oktabins or big bags to the conveying scales. Here too, switching is fully automatic. When all the major

and medium-sized components required for the formula are in the conveying scales, they are emptied into the downstream mixer.



Product intake out of big bags



Product intake out of Oktabins



Mixer feeding with feed of the aggregates, dyes, additives

Complete production transparency right up to filling

User-guided manual weighing stations for small quantities

Small quantities of dyes, additives, aggregates and similar substances are weighed on each line using user-guided ManDos weighing stations and are then emptied manually, although with barcode monitoring, into the appropriate mixer. This means that only the mixer is contaminated and the remaining conveyor system does not have to be cleaned when the product is changed. "This is a decisive factor in keeping the amount of cleaning during our frequent formula changes at a reasonably economical level," explains Markus Fiedler, Production Manager at Bada AG. After the mixing process, the homogeneous batch is transferred to a downstream capture container, which in turn is downstream from a differential metering unit, which then loads the extrusion process beyond.

"As the material feed can never be interrupted during the continual process, process safety in this area is criterion #1 for us," emphasises Andreas Schettler, Managing Director of Bada AG.

After extrusion, granulation, sieving and subsequent cooling, the granulate falls into a suction pot and, once there, is conveyed pneumatically using a gentle vacuum dense phase conveying system to two mixing silos over the filling station. This conveying must take place very carefully, as the conveyed products have a very high proportion of glass fibres. "Special pipe bends and very slow conveying speeds ensure a long lifespan for the conveyor system," says Fiedler.

The finished product is distributed via a two way valve to the two



ManDos, operator-guided manual weighing of dyes, additives and aggregates

mixing and intersecting silos with a mixing device. There, the still warm granulate can cool down somewhat, before being filled into sacks or Oktabins, according

to the quantity produced, using a special filling unit with a scale.



Extrusion process



Granulate cooling and feeding of the filling-homogeniser silos



Filling of the special compounds in sacks

Perfect tracing back of batches

The new process control and visualisation system allows optimum planning and control of formula changes and cleaning. At the touch of a button, the system calculates how many products are still available for production. Appropriate balances keep an accurate record of the quantities produced. In the formula all the products are metered, weighed and registered inside very narrow tolerance limits. Any products weighed on the user-guided, manual ManDos weighing stations are also accurately registered and documented. This means that it is easily possible to trace a batch and provide proof of the composition of the produced granulates at any time. Even in the old plant, Bada AG knew AZO as a reliable partner. Thus, the

company was able to count on the comprehensive consultation during the planning and implementation of the project. The experiences with the old plant, influenced the new plan, thus increasing process safety. For Andreas Schettler, for example, it was particularly important to replace the aged software with new, expandable process software, to provide long-term investment security. For the production manager, Markus Fiedler, it was quality and stability of values, along with low extra costs, such as energy consumption, which were at the forefront of this investment.