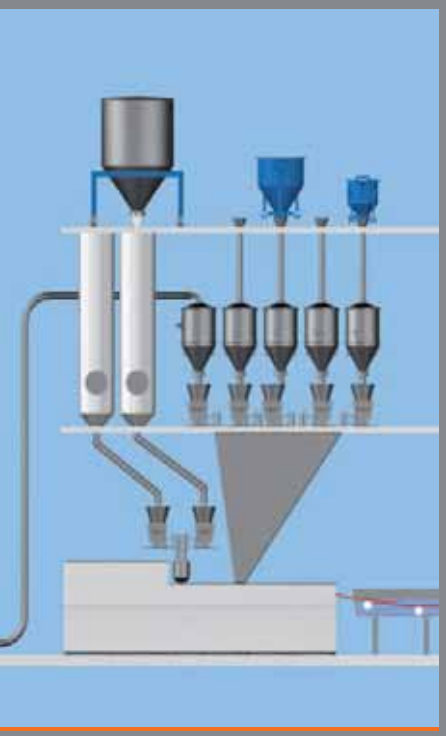
Production of engineered plastic compounds

with highly versatile, state-of-the-art process control technology

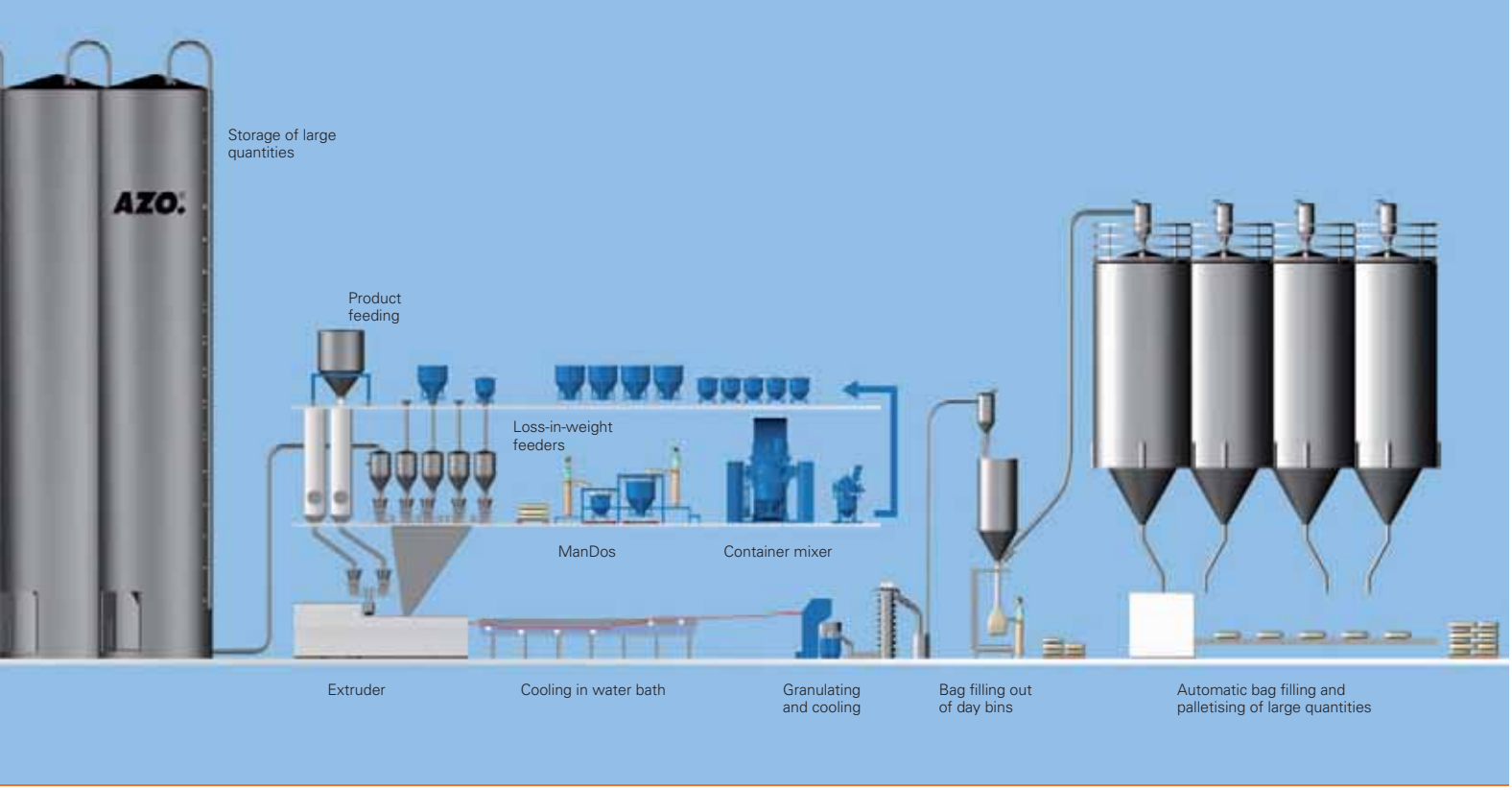
THE SOLUTION



AKRO-PLASTIC

The No. 1 in mixer feeding

AZO®



Material flow chart

Stringent requirements for engineered plastics:
Reliable handling of raw materials is absolutely essential

The customer

The production area at AKRO-PLASTIC's Niederzissen facility was expanded by 20,000 m² in 2012 in order to meet growing demand. AZO was given the order to engineer continuous, gravimetric feeding for four new compounding lines. The top priority was to achieve a high standard of safety and flexibility in storing and feeding raw materials. There are plans for further expansion of the production areas.

AKRO-PLASTIC, which has belonged to the Feddersen Group since 1988, is an expert for innovative plastic compounds. It has an accredited materials testing laboratory and demonstrates a high level of expertise in manufacturing polyamide and polyester compounds. Besides the main facility in Germany, the company also has a site in China and an associated company in North Africa.

Another production site is planned in South America. At its Niederzissen facility, AKRO-PLASTIC is in a position to meet the ever more stringent requirements and rising demand for plastics compounding at one of Europe's most modern production plants. Since the launch in 1988, the company has expanded to achieve a global production capacity of up to 100,000 tons annually.

Production building with outdoor silos in the Niederzissen facility

Manufacture of high-quality special compounds

Investment targets in detail

1. Comprehensive system for handling raw materials, integrating all the suppliers in the value chain.
2. Modular concept that allows for further expansion
3. Maximum flexibility in using a variety of raw materials
4. Systems that are easy to clean and fast to change over
5. Economical and efficient production of small, medium and large batches
6. Continuous process monitoring thanks to a user-friendly process control system
7. Reliable partner, who still provides support for servicing and spare parts even years later
8. Certified quality and environmental management

AKRO-PLASTIC puts its focus on individuality. Besides a wide variety ranging from standard compounds to special compounds, AKRO-PLASTICS strong point is its extensive expertise in the application-oriented use of polymers.

In addition to its own products, special compounds and master batches are also contract manufactured for customers: from small order quantities to full service with the very highest standards of quality. This is also where its extensive experience in technical plastics pays off. Production includes ultra-modern plants for extrusion, underwater and water-ring pelletising as well as twin screw extruders with variable processing lengths.

Special challenges

The diversity of product characteristics for engineered plastics requires a multitude of raw materials, which need to be conveyed safely to the correct extruder in the right quantity and required tolerance and at the right time. Intelligent process control is absolutely crucial here. In order to allow maximum flexibility in the delivery of the raw materials, it must be possible to feed from very different types of containers.

Another challenge was posed by the service model for contract compounding and engineering of formulations, which require frequent changing of recipes. Rapid, straightforward change-overs with short cleaning times are a top priority here.

Delivery of raw materials in bulk containers

Silo fill lines with tank truck coupling

Pick-up cone with four outlets in the silo skirt

»Our strong point is a rapid response to customer demands. We develop new formulations in collaboration with our customers. A flexible concept for an easy-to-clean plant is a significant step to success here.«

Jürgen Wahl, Technical Director
AKRO-PLASTIC GmbH

Extruder filling via loss-in-weight feeders

Secure investment thanks to a modular system for feeding raw materials

The AZO solution in detail

Delivery and storage of large components
There are several outdoor silos made of aluminium provided for this task that are designed in part as a two-chamber system. Level probes monitor the product level in the silo, making sure that timely reordering is possible. To ensure safe storage of hygroscopic products, the silos are equipped with silo head space drying. The silo area was already designed to allow for installation of additional silos.

Delivery is either in standard bulk tankers with their own blower, or in bulk containers which are docked onto a stationary pressure blower. The containers are tilted on the truck, so that the product flows smoothly into a hopper and is transported by the pressure conveying system from there to the silo. As the raw materials flow very easily, a pick-up cone, which can be connected to several conveying lines, is sufficient for discharging the product from the silo and feeding it into the conveying system. Distribution to the compounder lines is carried out via a central coupling station. After the conveying path has been set, the raw materials are transported to the receivers above the extruders with the aid of pneumatic vacuum conveying systems. These serve as feed vessels to fill the loss-in-weight feeders. This way the receivers can be refitted without much effort so that they can also be filled by gravity via a fill pipe.

Manual coupling station for setting the route from the outdoor silos to the compounding lines

Vacuum pumps with upstream secondary filters in separate blower chamber

»In ManDos we have found an operator-guided and recorded system for additive premixes that, in conjunction with the latest mixer technology, has boosted our competitive edge significantly. By working closely with the manufacturer of the mixers, we were able to develop a solution that offers an optimum level of flexibility.«

Jürgen Wahl, Technical Director
AKRO-PLASTIC GmbH

Manual ManDos station for precise weighing to the exact gram and feeding micro quantities

Supply of additives using ManDos:
secure, operator-guided and fully documented

Addition of medium and small components
On the second level, above the receivers, it is possible to feed from a variety of containers. Bag dump stations are provided for bagged goods. Different-sized mobile containers and mixing vessels can also be docked onto the fill pipes, which feed into the buffer bin or receiver on the floor below.

Special raw materials like glass fibres are supplied in larger-size buffer hoppers, from which two loss-in-weight feeders are filled. They are stationed directly above the extruder on level 0.

Special supply of additives
Using the ManDos manual weighing station, mixing vessels can be filled with previously weighed quantities with little generation of dust. The controls do guide the machine operator reliably through the weighing process. It is possible to add entire bags, but also to weigh micro quantities using platform scales and then add them to the mixing vessel. Errors in production are avoided as the computer prompts operators through the weighing process. Production is documented simultaneously, enabling batch tracing. This cuts down losses or wasted batches of ingredients.

Once all the components needed for the formulation are in the mixing vessel, it is moved to the container mixer, inserted and a homogeneous mixture is generated. The mixing vessels are now ready in position with a work order code and can also be fed into the continuous gravimetric dosing process on level 2 via the buffer hoppers.

Manual ManDos weighing station for discharge of pre-weighed bags into mixing containers

A homogeneous mixture is generated directly in the container using the container mixer.

»The unique and gentle compounding process, ensures customers to obtain maximum, consistent quality, if required with adherence to formulation that is documented for years. The prerequisite for this is also gentle pneumatic conveying systems. AZO is renowned throughout the world as the expert in this field.«

Jürgen Wahl, Technical Director
AKRO-PLASTIC GmbH

Flat vibrating screen for separating oversize and undersize pellets

Providing the ideal response to the demands of the market – with large, medium or special batches

Compounding and filling of small batches in bags

After compounding on a twin screw extruder, the polymer fibres are quenched in a water bath and then pelletised. A subsequent vibrating screen separates oversize and undersize pellets. After the granulate has been cooled further in a helical cooler, it can be transported to the day bins using pneumatic vacuum conveying systems. A metal separator installed in front of the silo prevents any metal residues from contaminating the finished product. Conveying tubes made out of glass are used due to abrasive components in the granulate. These tubes are much more wear resistant than metal pipes. To avoid static charge, the conveying lines are fitted with grounding cables. Small batches are filled into bags from the day bins via a semi-automatic bagging line.

Feeding the day bins via receivers with subsequent metal separator

Extruder screw with pelletiser, screen and helical cooler as well as a day bin with bagging line

»We need maximum availability of the AZO plant technology in the on-going production, with flexible, short lead times and individual, customised delivery and order processing.«

Jürgen Wahl, Technical Director
AKRO-PLASTIC GmbH

Indoor silos for storing finished goods

Filling large batches in bags
There are ten indoor silos available for intermediate storage of large batches. These are filled from the day bins using vacuum conveying, once the samples that were taken beforehand have been approved in the laboratory. Each day bin can be docked onto the right indoor silo at a coupling station. A mobile bagging line is positioned below the relevant indoor silo to fill and pack bags entirely automatically.

The bags are transported from here to a pallet line where they are packed ready for shipping.

Generating partial vacuum
The vacuum pumps for the vacuum conveying systems are housed in a separate blower chamber. A secondary filter upstream protects them from dust and contamination.

Conveying tubes made from glass with copper grounding reduce wear from abrasive products

Indoor silos with finished goods for automatic bagging and palletising

2505 1093 GB

Conclusion:

»A decisive factor behind our choice of AZO was the advantages regarding quality and technology.

Planning, consulting, project management and commissioning were all spot on, in addition to the execution. We were offered assistance every step of the way.«

Jürgen Wahl, Technical Director
AKRO-PLASTIC GmbH.

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