The target group for chewing gum manufacturers is mainly children, teenagers and young adults. The product with the usual sorts of chewing gum (various flavored strips and dragées) is the highest seller among this group of customers. A smaller share of sales comes from oral care, breath freshener, health and nicotine chewing gum.

Nowadays there are many different types of chewing gum, from standard chewing gum strips to sugar-free and oral care chewing gum through to nicotine chewing gum. The original ingredient chicle (the milky juice of the sapodilla tree) is still used even today, for instance as the gum base for organic products. A variety of synthetic ingredients are now used as the basis for chewing gum (mainly vinyl and butadiene polymers). Manufacture of synthetic bases for chewing gum was started after the required quantities of the natural raw material were no longer available to meet the demand.

Types and varieties of chewing gum

- **Standard chewing gum**
  consisting of gum base (natural or synthetic), flavorings, sweeteners - strips or roll
- **Bubble gum**
  consisting of gum base (natural or synthetic), flavorings and sweeteners, however with more elastic gum base material than usual, which makes large gum bubbles possible, thicker blocks, slightly softer mass
- **Sugar-free chewing gum**
  consisting of gum base (natural or synthetic), sugar substitute, usually polyalcohols (mainly sorbitol and xylitol), flavorings and usually natural sweeteners
- **Oral care gum**
  consisting of gum base (natural or synthetic), flavorings, sweeteners and special granules for cleaning teeth
- **Organic chewing gum**
  consisting of gum base (natural), flavorings and natural organic sweeteners
- **Nicotine chewing gum**
  consisting of gum base (natural or synthetic), flavorings and sweeteners, with added nicotine
- **Healthy chewing gum**
  consisting of gum base (natural or synthetic), flavorings, sweeteners and active substances acting against nausea and stomach ache

Regardless of whether chewing gum is being made into strips, blocks, rolls, balls or dragées, AZO’s job is to plan how the flavorings and other ingredients are added and provided for the kneading and mixing process.

Chewing gum consists mainly of five main raw materials; these are gum base, sweeteners/sugar, flavorings, thickening agents and other additional ingredients.

**Objectives**

The main task for AZO when it comes to chewing gum production is designing the feeding of mixers and kneaders – mainly with the raw materials of sorbitol, mannitol and xylitol (all sweeteners). The products here are frequently conveyed in different forms; it makes no difference whether granulated or icing sugar is involved however. From product feeding through to the buffer bin or scales, pressure conveying is mostly used. This is often followed by a vacuum conveying system that distributes the products to the mixers and kneaders.

**Product feeding**

At the customer’s, products can be fed from large and small sacks, drums, big bags or silos. Depending on the type of container, there are different discharge bases to deliver the product into the pneumatic conveying lines.

**Screeners ensure quality of products**

After product feeding, a check needs to be made to ensure that the product contains no foreign materials. Appropriate screeners for the product are used to cleanly separate coarse from fine material.

** Grinding the product**

The product also needs to be ground before use in order to satisfy customer requirements as to grain size. So-called sugar grinders are employed here, frequently positioned immediately after each discharge station.
Safe storage of product
Silos, receptacles, sacks, big bags or drums are suitable for storing the above-mentioned types of sugar. However attention must be paid so there is no caking in the respective product. This is why so-called icing sugar mixing vessels are particularly used to store powdered sugar. They ensure that the product is in constant motion and is kept as cool as possible. This prevents caking.

Pneumatic conveying systems for mixer feeding
What is key in the chewing gum manufacturing process is to convey the required quantities of sugar in the best quality and with as little caking as possible. An important aspect here is pneumatic conveying with cool, dry air to prevent caking of this kind. Generally, products are fed to kneaders, in which all ingredients for the formulation of the particular chewing gum are mixed directly. Dust, which is generated both during product feeding and during discharge into the kneading machine, is extracted using a central filter.

Dosing and weighing in strict adherence to the recipe
In order to ensure the most precise batches possible, the customer has the option of ManDos stations, container systems and hoppers with load cells for the weighing process. Dosing screws of different sizes, slide gates or rotary valves can be used for dosing, depending on the required level of precision.

Investment objectives
- fully automatic feeding of mixers and kneaders
- batches with narrow tolerance limits
- fully documented batch tracing with “tracking & tracing”
- feeding and storing raw materials for mixers and kneaders without any caking
- consistently high product quality

Requirements
In general, the different stages in the production process for chewing gum are fairly straightforward. The product is first ground, if required, and then added to the kneading process in the form of a fine powder or icing sugar. It is important here that the product does not cake, either during conveying or possible interim storage. This is why mixing containers for powdered sugar are required following a sugar grinder or discharge base in order to keep the product in motion and to cool it so there is no caking. The sugar substitutes sorbitol and xylitol tend...
to cake quicker as a result of their hygroscopic properties.

In addition, the product may not contain any foreign matter, which can be ensured by screening. It should also be ensured that deposits of the product in the pipe are prevented, or that they are easy to remove. The entire process should run without generating dust.

**The AZO solution**

Variable product feeding in silos with subsequent pneumatic conveying and feeding of several conveying scales above the kneaders/mixers.

The main components in chewing gum production, such as sugar, sorbitol, mannitol or xylitol, that are used in large quantities are usually delivered using bulk tankers or big bags. Bagged goods are usually special sugars and/or sweeteners or sugar substitutes or other small quantities. Vacuum weighing systems are used, among others, to feed the kneading/mixing machines. Products are fed differently depending on the type of receptacle. Bagged goods are fed via feeding hoppers; large big bags are fed via big bag discharge stations. Then the product is put into small silos for interim storage or fed straight into the conveying line. Depending on the formulation, the raw material is transported by way of a pneumatic vacuum conveying system conveying scales above the kneaders/mixers, after it has been discharged through dosing units and metered into the conveying line. In order to clean the containers and pipes, they are flushed with dry air, which is cleaned via a central or zone-separating filter. When feeding products as bagged goods or from big bags via a manual feeding hopper, there is an option to operate this hopper with an additional filter in order to ensure little dust is generated during feeding. A big bag connection can also be attached to the feeding hopper, enabling sacks and big bags to be discharged at the same station.

Under special circumstances, lump breakers need to be installed to break up the product and prepare it for the next process. Vibration bottoms, aeration bottoms and vibrators can be employed to achieve optimum discharge, depending on the product. Dosing screws or rotary valves can be used as dosing systems. This ensures that the product is metered evenly into the conveying line in vacuum conveying. Screeners are installed after product feeding, in order to separate course material and foreign particles from the product. The fine material remains in the conveying line. The product can then pass through a sugar grinder, according to customer requirements, in order to change the particle size. Sugar mixing containers are installed following the sugar grinder to cool the ground product or the icing sugar and to keep it in motion so that there is no caking. If the customer requires screening of the product in mixer feeding, it is possible to incorporate the time-tested AZO cyclone screeners, types DA and E.

When the mixers are fed directly, vacuum weighing systems operate upstream of the kneaders/mixers. Conveying scales are fed with the product through the vacuum conveying system, which is downstream of the buffer hoppers.

Either a single or a multi-pipe system is called for, depending on the product. In the case of a single-pipe system, a line goes from each silo to the conveying scales. The advantage of this design is that the system costs less overall and outlay for installation is also lower. With a multi-pipe system, a conveying line goes from each discharge base via a multiport valve to the conveying line. The multiport valve regulates the airflow to the respective product discharge base and the product overrun. Discharge bases in different positions and rapid changeover of components are the key advantages of a multi-pipe system. What is more, thanks to the multiport valves, which prevent product overrun, it affords higher dosing accuracy.

The entire system also needed to comply with ATEX protection guidelines, i.e. that explosion protection flaps and locks...
are installed at the relevant positions in the plant. In addition, the exterior walls of sugar silos are reinforced and rupture discs are fitted so that, if there is an explosion, the excess pressure can be relieved at a specific point.

**Feeding sprinklers with cornflour/icing sugar**

In various manufacturing processes, the cut chewing gum products are then sprinkled with cornflour or icing sugar in order to prevent them sticking either to the packaging or when pieces are cut off from a roll of chewing gum. Pressure conveying systems can be installed, which will feed one or more sprinklers with cornflour or powder. Again, the rule applies: with one product feeding point and several discharge points, pressure conveying then makes most sense.

The option of direct, continuous feeding of the sprinkler from a container or silo suggests itself here. The product is conveyed from the product discharge base or the buffer hopper to the receiver above the sprinkler. Here, several sprinklers can be fed simultaneously from a single discharge base, as use of cornflour or icing sugar is relatively low in this step of the process.

**Batch automation with container system**

In chewing gum manufacture, batch automation is ideal for small and medium quantities of powdered materials, in addition to pneumatic conveying of large quantities of sugar or other main components. In this case, a batch process for the components first takes place and they are then transported to the relevant kneading machine/mixer. This makes it possible to retrieve a large variety of recipes very quickly and flexibly in chewing gum production.

With the AZO COMPONENTER® the formulation is taken from big bag discharge bases, feeding hoppers or small silos. Dosing units are installed below the discharge bases and they dose the correct amount for the formulation to the container scales below that are moving on one line. Prior to this, the container is deposited on the scales, which are positioned on a mobile module that positions the container below the discharge base to fill the product. Next, after the container has been filled with the complete formulation, it is removed from the mobile modules at the end of the line and discharged into a mixer.

This entire process runs fully automatically with a process control system and is visualized clearly. This process control system can be provided by AZO CONTROLS. The most important point about manufacturing chewing gum is the handling of sugar and sugar substitutes. A completely closed conveying system must be employed since the substitutes mannitol, xylitol and sorbitol are very hygroscopic.

**Key No. 85506**

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