

# Report

## Starch, a true all-rounder - from grain to high-end product

Zeppelin Systems improves processes for the production of modified starches

**Rödermark, October 2020.** The market for starch and starch derivatives has grown strongly over the past 25 years, almost unnoticed. The background to this is that the range of applications for modified starches and proteins in particular has been considerably expanded. Plants from Zeppelin Systems offer new ways to increase the efficiency of their production.

Zeppelin Systems has long been a partner for equipment for the starch industry. At first glance, the process for obtaining starch does not appear particularly complex. But in detail, many processing steps are required, for which Zeppelin Systems has been supplying systems and components for many decades. This starts with the storage of raw materials, but also of end products such as dextrans and modified starches in silos and big bags with the corresponding feed and discharge systems. This is followed by systems for pneumatic conveying (e.g. 30 t/h) and the handling of the ingredients (mixers, screening machines, dosing devices, filters etc.) up to systems for further processing (loading systems for trucks or trains). Of course, plant servicing and automation are also part of the offer.

### Starch as a trendsetter for innovative products

The future of the starch industry belongs to refined products. Starch producers have now also discovered this market for themselves. In the past, their process ended with the sole extraction of starch. Today, other markets are opening up, for example in the plastics or paper industry. For example, starch is now considered the most important renewable raw material for the production of bioplastics in terms of volume. What is particularly interesting about starch processing is that vegetable proteins are obtained as a by-product, which are used for vegetarian foods and meat substitutes - a market with enormous growth potential.

### Meat substitutes on the rise

The worldwide market for vegan meat substitutes has been showing an upward trend for years. According to a study by A.T. Kearney consultants, the new substitutes could account for 28 percent of the total meat market in 2030. In ten years, this figure could even double to 60 percent. Zeppelin Systems is already feeling the effects of this trend today - in its own Rödermark pilot plant, the number of requests for processing tests has risen sharply over the past three years.

Proteins isolated from the raw materials play a special role in the production of meat substitutes. Together with various ingredients, such as spices and flavourings, they are used to produce meat substitutes which has similar taste and structure to the meat. For an exact dosage - without destroying the structure of the protein textures - a highly automated weighing and dosing process of the individual ingredients are required.

Zeppelin Systems stands out here with the MinDos or MicDos systems. MinDos (Minor Ingredients System) is an expandable system of two to eight dosing containers, which feeds the ingredients through screw conveyors into central hoppers. MicDos (Micro Ingredients System), on the other hand, allows greater flexibility in the number of ingredients, as it is expandable. Moreover, both systems eliminate contamination completely.



*The Micdos high-performance metering system is expandable and allows high flexibility in the number of ingredients*

The continuously operating Codos NT Kneader is also used here. The system plays a key role in efficient processing by combining raw material conditioning with a kneading system. Studies have shown that the addition of raw materials to the kneading process, for example the place of feed, the quantity, solid or liquid etc., has a considerable influence on the final product. This is also evident in the production of meat substitutes. Among other things, the system allows a very even distribution of liquid and temperature. Furthermore, it can be quickly adapted to different performance requirements and also work perfectly from a hygienic point of view, as it is very easy to clean.



*The Zeppelin Systems pneumatic mixer (homogenizing silo with fluidizing bed bottom) produces a homogeneous mixture without mechanics, friction or high friction.*



*Gravimetric metering, DymoMix™ and Codos as well as pre-dough fermenters are available at the Zeppelin Technology Center in Rödermark for companies who want to carry out tests with their own raw materials.*

### **React quickly to changing market requirements**

Zeppelin Systems is also increasingly focusing on the production and treatment of modified starches, derivatives and proteins. The aim is to meet the constantly increasing demands of the food industry, whether in terms of purity, traceability and processing speed, or product variety. For example, manufacturers usually have to pay close attention to the separation of allergen-free, gluten-free and genetically modified raw materials (GMO). Industrial companies are often confronted with a whole range of special tasks, such as recipe changes and at the same time the production of grade-pure and batched products.

### **Gentle on the product and a uniform end product**

The general goal in starch refining processes is to produce starch particles that are as uniformly shaped and coloured as possible. This depends on many factors that are already present before the raw material is delivered to the factory (e.g. geographical location, time of harvest, weather conditions and many others). Special aggregates must be used to balance these different characteristics of the raw materials.

Homogenizing silos with fluidized bed, as used by Zeppelin Systems, are very suitable for this purpose. Large flakes are retained. The homogenizing silos have very good mixing characteristics and can also handle larger batches. Depending on the bulk density, these

silos can hold about 60 tons of starch products. The fluidized bed lining is optionally made of PE or stainless steel. While a PE fluidized bed lining has a temperature resistance of up to 70°C, the temperature resistance of stainless steel is considerably higher. The durability strength of the fluidized bed coverings made of sintered stainless steel is also much higher. Therefore, in the past years, stainless steel fluidized beds have been increasingly used.

### **Wetting preserves starch flakes**

The DymoMix™ (Dynamic Moisture Mixing System), which was originally developed for bread doughs, is also the star in starch processing. The DymoMix™ wetting system works as a pre-mixer and is used as a supplementary production step between dosing and further processing steps. The special feature is that powdery components are wetted with water or oil, immediately producing a homogeneous mixture. The wetting with water or oil is achieved by a specially developed nozzle, which is installed in the rotating shaft of the device. This forms a liquid shield through which the powdery particles must penetrate and are thus wetted. In contrast to conventional systems, the wetting is not carried out with a high-pressure water jet, but by means of centrifugal force.

This allows e.g. potato starch flakes to be sprayed with flavouring agents. The starch particles fall through a kind of water mist produced by a centrifugal atomizer.



*DymoMix™ can be used to moisten starch.*

**Conclusion:** The examples mentioned are just a few of the system components from the Zeppelin Systems portfolio that are used in the production of starch modifications, but also in further processing. In addition, silos, filters, feeders and discharge devices also ensure efficient processes in the starch industry.

AUTHOR

DR. CHRISTIAN FABER

Senior Technology Consultant

Food Processing Plants

Zeppelin Systems GmbH