



SEPARATION

**AN AFFORDABLE SOLUTION
TO THE ESSENTIAL
NUTRIENTS SHORTAGE**

ALGAE DRYING

ANDRITZ

ENGINEERED SUCCESS

Qualitative algae drying for the food industry

Microalgae are small, plant-like organisms that float freely in water, also called phytoplankton. In the North Sea, a liter of seawater contains between one hundred thousand and one hundred million plankton algae. Algae are able to live with the aid of light as an energy source and by incorporating of inorganic substances. Thanks to their photosynthesis, algae are largely responsible for life on earth. They produce about half of the oxygen in the atmosphere and consume a large amount of carbon dioxide when growing. Moreover, life in the oceans, seas, and lakes is highly dependent on microalgae because they form the beginning of the food chain.

THE BEGINNING AND THE END OF THE FOOD CHAIN

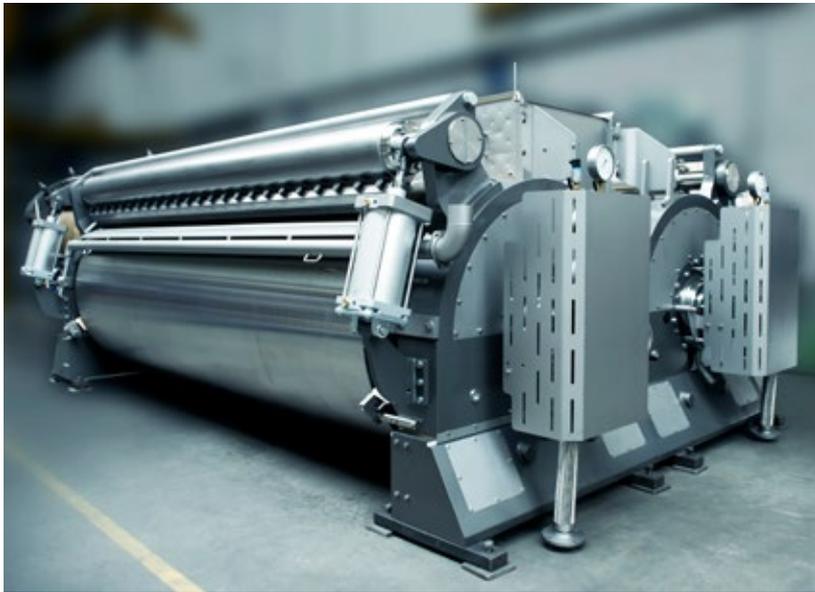
In the food industry, one of the hot topics is how we will feed mankind in the future. Because algae are available in abundance, they can provide an affordable solution for the impending shortage of nutrients. Algae are rich in a number of these essential nutrients, such as proteins, antioxidants, and omega-3 fatty acids. Qualitatively processed algae are ideal, nutritious additives for pasta, bread, crackers, soups, and sauces, for example, and even for sports drinks.

INNOVATIVE PRODUCTION PROCESS

Algae in powders, tablets, or capsules have long been used for animal feed, nutraceutical or cosmetic applications, but their uses in the food industry are also increasing. In Asian bars, it is very common to be offered algae chips with a beer. In the European food market, however, algae are still a relatively new product and they are subject to very strict quality requirements there. The cultivation of algae begins by eliminating bacteria and fungi, leaving only pure algae. The algae are harvested at the peak of their nutritional value. Water is removed, and a yogurt-like substance that can be processed in different ways remains. One possibility is to dry the algae paste rapidly with an industrial dryer. The result is bright green flakes that are then ground into powder. Algae powder can be used in many food products.



The pinnacle of industrial drying



ANDRITZ Gouda drum dryer



Drum dried algae

Algae paste is usually dried with an atmospheric, double drum dryer, which is drum drying with an open machine at atmospheric pressure (normal air pressure). For more than a century, ANDRITZ Gouda has been specializing in food processing production lines based on the advanced drum drying technology.

ALGAE PASTE DRIES EXTREMELY FAST

The drum dryer is a so-called thin-film contact dryer. A very thin layer of the product to be dried is applied to the outside of a rotating cylinder (drum). This drum is heated on the inside by steam. When in contact with the heated surface, the liquid evaporates very quickly from the thin product layer. Steam heating provides uniform temperature distribution over the drum surface, and this results in a consistent product quality. Because of the continuous, indirect drying method and the short retention time of the product at high temperature, virtually no heat damage will occur. Also taste, smell, and texture quality of the product are guaranteed. The viscous algae paste dries extremely well under these conditions. If other types of dryers are used, the product should not be de-watered so far prior to drying, and more water needs to be evaporated in the dryer as a result. If drum drying is used, it is possible to remove more water first of all by mechanical means in a centrifuge, so the drying process starts with a more concentrated product. Separating water mechanically

is much cheaper evaporating it in a dryer. Energy consumption is much higher for evaporation. Algae paste drying in a drum dryer is a highly efficient and high-quality production process.

AND IF THAT IS NOT ENOUGH

An alternative process for algae drying uses a vacuum double drum dryer. The drums are placed in a vacuum tank and drying takes place under greatly reduced pressure. The boiling point of the water is reduced considerably because of the vacuum. In an atmospheric drum dryer, water evaporates at about 100 °C. In a vacuum dryer, this occurs at 50 to 60 °C. When algae can be dried at lower temperatures, the product quality is even better. Although the investment for vacuum drying is higher than for atmospheric drying, it can be the alternative if the characteristics of the dried product for the particular application so require.

KEY FEATURES

- Highly efficient drying process
- Particularly suitable for viscous materials
- Superior and constant product quality



WHAT'S YOUR SEPARATION CHALLENGE?

ANDRITZ Separation is the world's leading separation specialist with the broadest technology portfolio and more than 2,000 specialists in 40 countries. For more than 150 years, we have been a driving force in the evolution of separation solutions and services for industries ranging from environment to food, chemicals, and mining & minerals. As the OEM for many of the world's leading brands, we have the solutions and services to transform your business to meet tomorrow's changing demands – wherever you are and whatever your separation challenge. **Ask your separation specialist!**

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