

Extraction with Rotary Pressure Filters Brings Best Flavor

Instant products provide consumers with natural flavors in a concentrated, long-lasting format. The final granulate is the result of a multi-stage procedure that starts with an extraction. Hot water or steam is used to leach aromas from a solid. Traditionally, this process step involves the use of extraction columns. BHS has optimized extraction processes at various customers by introducing rotary pressure filters. This increases the yield and improves the taste of the final product. Owing to these properties, producers and end consumers both benefit from the alternative process.

Extraction is first and foremost about preserving the natural aromas and ingredients of plant products. Successful extraction should result in a final extract that retains both the taste and aroma of the original product – be it dry fruit, coffee beans or plant parts. Producers naturally also endeavor to maximize yield. Given these requirements, the challenge is to achieve the right balance between quality and quantity. This is related to temperature, water throughput, grinding degree and processing time. For this process step, extraction columns are frequently used. The solid is ground and fed into these tall vessels, and then hot water or steam is passed through them from the bottom to the top. The flavoring is separated

from the solid and drawn into the liquid. Next, it is concentrated and freeze-dried. As a result, a marketable extract of the base substance is obtained. When mixed with hot water, the preserved aromas and flavors are released again.

Traditional extraction process shows room for improvement

The extraction columns traditionally used in this area do not allow for continuous extraction. Each of the extraction columns connected in series contain the product in a different state of "aging". The first extraction column holds material in its most diluted form. It is the first to be flooded with fresh steam or hot water. The resulting minor

concentrate then moves on to the next extraction column with fresher material. The final extraction column contains the new product, and the water running through it already contains a highly concentrated solution. This counterflow washing process needs to be interrupted at regular intervals when the various extraction columns are refilled. From an engineering point of view, this requires the flow of water to be reversed from time to time, to ensure that the mostly consumed product remains at the beginning of the array. The process thus maintains a maximum concentration difference. This is a complex process, consuming significant time and resources. Furthermore, unsuitable particle sizes – which can occur due to variations in the natural raw material or due to imperfect grinding – cause clogging of the extraction columns. Should this happen, the entire process comes to a standstill until the problem has been resolved.

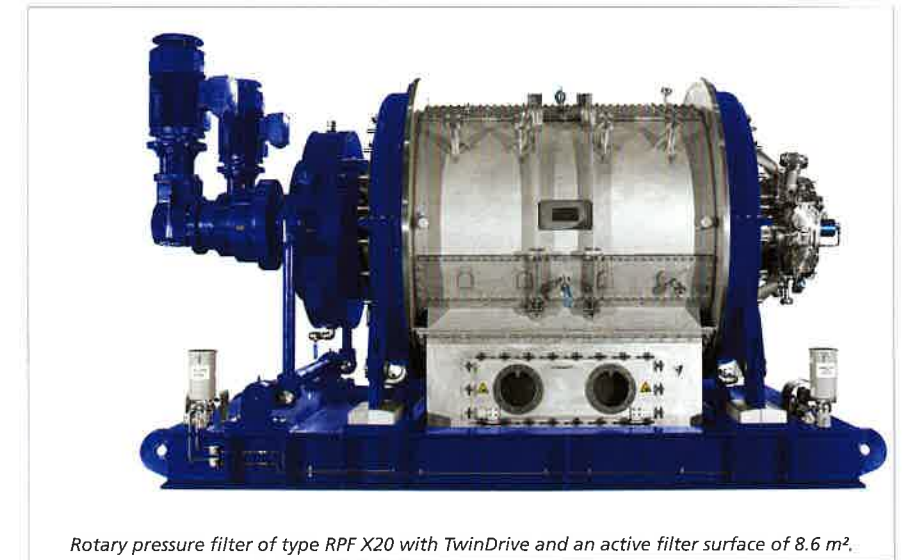
BHS rotary pressure filters improve efficiency

In search of a solution, BHS-Sonthofen took a close look at the production process together with a customer. After conducting many lab tests, it was found that rotary pressure filters can enhance the extraction process in many ways. Not only do they provide the basis for implementing a continuous process, but they also increase the extract yield and speed up the overall procedure. The reason is that the product can be filtered at much smaller particle sizes. Moreover, the increased surface area greatly reduces the diffusion path, thus cutting the time required for extraction to just a few minutes. In comparison,

when utilizing extraction columns, the product needed to be exposed to hot steam or water for several hours at much higher temperatures. The rotary pressure filter furthermore helps to gain a surplus yield of 3-5 percent from the same amount of raw materials. Further, shorter exposure times and lower temperatures help to improve the quality of the final product. The more delicate extraction process better preserves the natural flavors and aromas – a difference highly appreciated by consumers. This example of BHS-Sonthofen innovation illustrates how process optimizations can improve the final product in addition to delivering cost benefits. Better yet, both the manufacturer and end consumer profit from this smart technology.

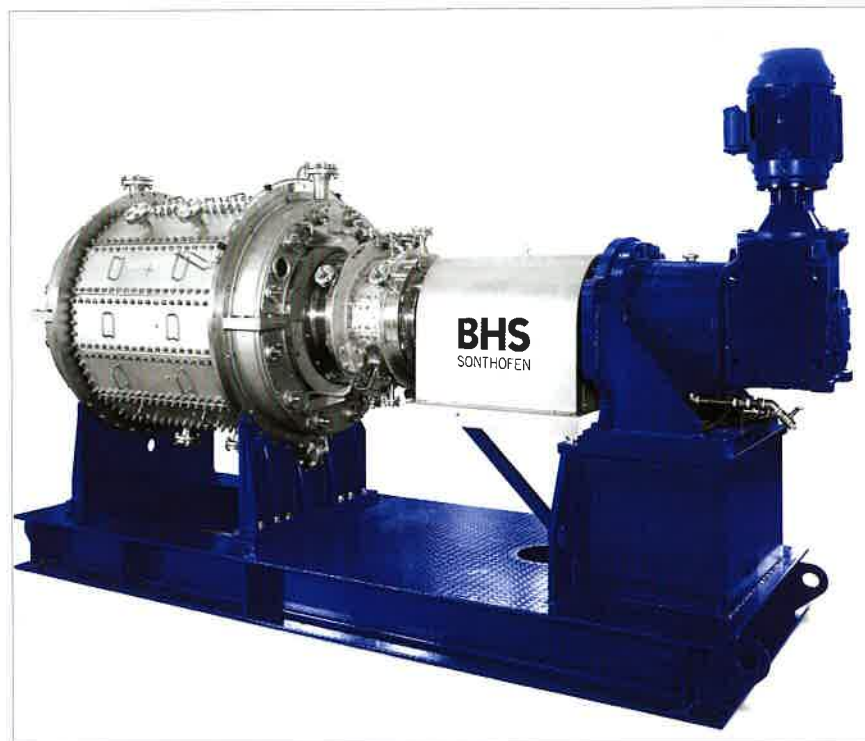
Used in production and research alike

The customer was highly pleased with the results of replacing the extraction columns with a rotary pressure filter: The long-term results were faster production, consistently higher yields, a significantly more reliable, fault-proof manufacturing process and related availability. Interestingly, the reason for reaching out to BHS-Sonthofen in the first place was not at all to replace their existing process. The company had been in search of a filter solution to remedy a side problem relating to the use of extraction columns – specifically, the contamination of the filtrate with solids. BHS-Sonthofen identified the root cause of the issue and worked out a process optimization in cooperation with the customer. What contributed to this successful collaboration were the series of thorough tests conducted at the BHS filtration lab and directly at the production site. This was taken a step further by also installing two pilot systems at the customer's European research center. They are still in operation and help to devise product enhancements or are used for consumer testing. With its ability to precisely control key parameters, such as temperature, washing water, exposition time or grinding level, the rotary pressure filter has proven the perfect tool for the job. This convinced the customer to apply this technology

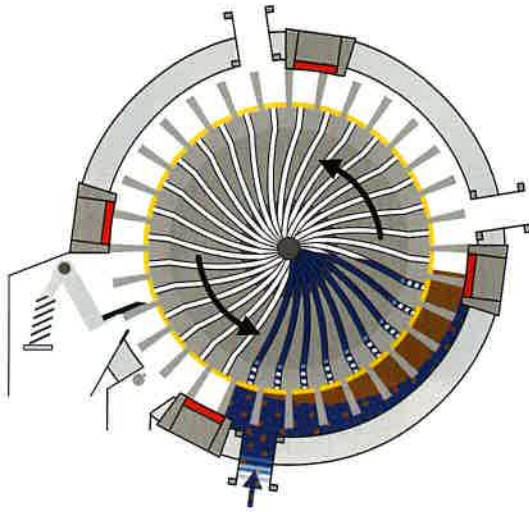


Rotary pressure filter of type RPF X20 with TwinDrive and an active filter surface of 8.6 m².

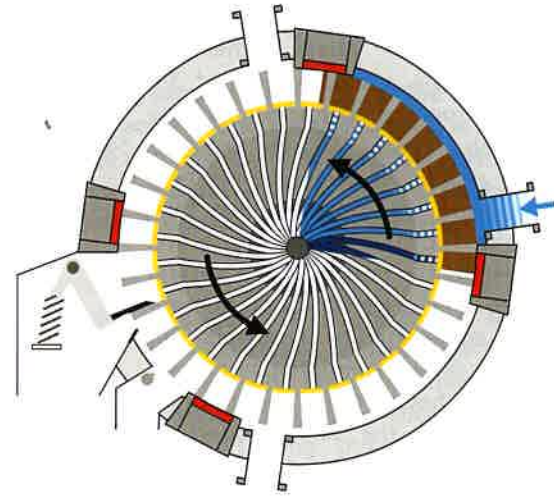
Typical rotary pressure filter of type RPF A09 with an active filter surface of 2.16 m² for use in pharmaceutical applications.



Stage 1, 'suspension feeding and filtration'

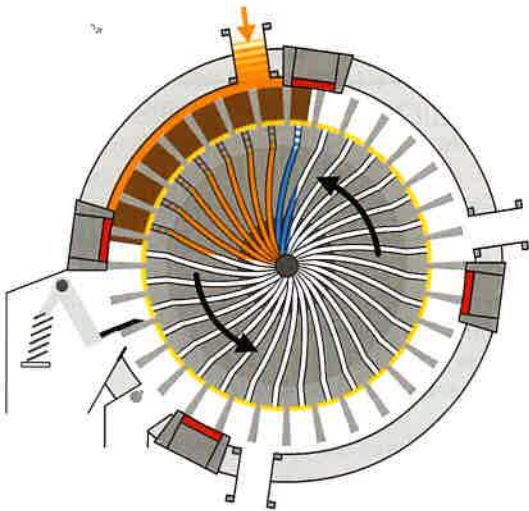


Stage 2, 'cake washing'

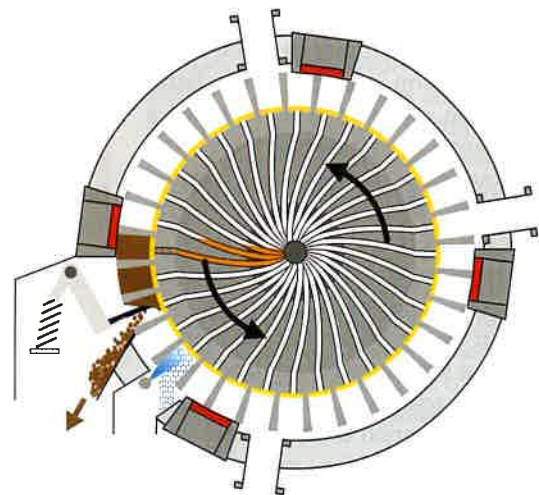


Images of stages 1 through 4: The individual process stages performed in the rotary pressure filter of type RPF during continuous operation. Starting with (a) suspension feeding and filtration to (b) cake washing and (c) cake drying all the way to (d) discharging the cake.

Stage 3, 'cake drying'



Stage 4, 'cake discharge'



on the production floor. At present, 15 rotary pressure filters optimize the extraction process across the globe, including sites in England, Germany, Russia, Japan, Switzerland and the Netherlands.

Rotary pressure filtration – Quality and versatility

BHS rotary pressure filters of type RPF contribute to a highly concentrated, high-quality extract. And these are the features that count when it comes to producing food and dietary supplements. Whatever the flavor – ginkgo,

hawthorn, St. John's wort, coffee, tea or others – the consumer always expects a product whose flavors were extracted in a mild, low-temperature process that preserves the natural flavor and retains all key ingredients and the properties attributed to them. However, the application range of the rotary pressure filter is not limited to the food industry. Any type of biological material can be subjected to extraction. With its high yield, superior product purity and mild process, this type of filter ideally meets the needs of many other industries, in particular those of pharmaceutical

companies. "It makes great sense to look into how BHS-Sonthofen might be able to optimize any existing extraction process," confirms Martin Schäfer, Head Process Designer at the Filtration Technology division. "Many customers are not even aware of the alternatives and the degree to which these technologies can boost process efficiency. BHS-Sonthofen is more than happy to put its extensive expertise in the area of solid-liquid filtration to use to quickly identify suboptimal process steps and show customers how to tap into this potential." 