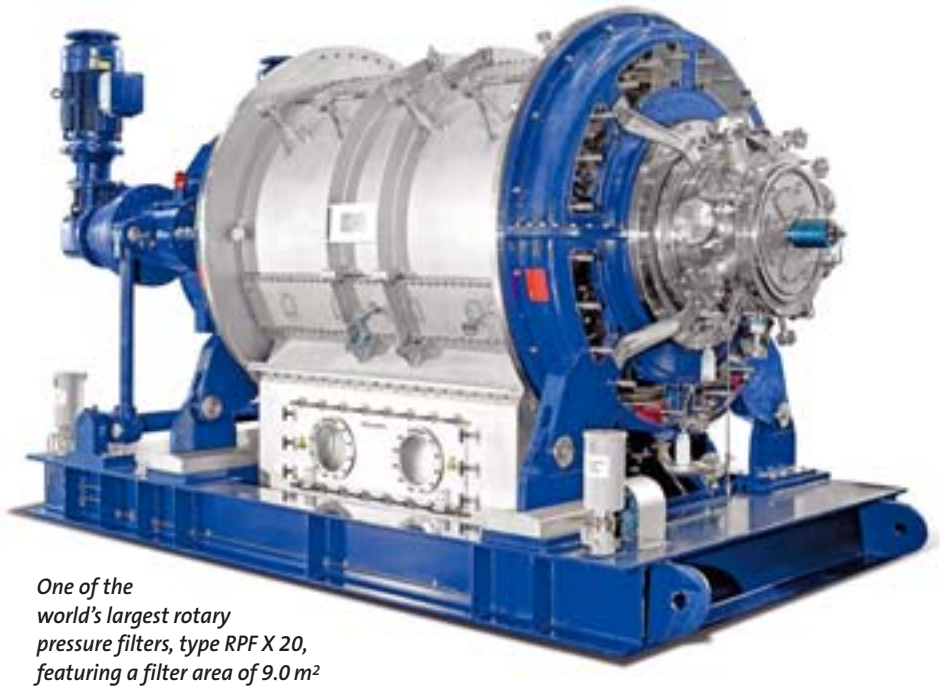
Rotary pressure filters for the chemical industry

Record performance in the drum

At the end of 2011, BHS-Sonthofen delivered five RPF X 20 rotary pressure filters to a customer in China. The filters are used in the manufacture of intermediate plastic products. In terms of throughput, they are the world's largest rotary pressure filters. A suspension volume of up to 225 m^3 is filtered per filter and hour. This is equivalent to roughly 100 t/h of solids per filter.

Filtrate drainage pipes to the control head inside the filter drum of a rotary pressure filter



One of the world's largest rotary pressure filters, type RPF X 20, featuring a filter area of 9.0 m^2

BHS recently set up a new record: with the addition of the X 20 filter to the range of rotary pressure filters, a filter area of 9 m^2 is now available for each machine. Previously, the type C 16 filter, featuring a filter area of 7.7 m^2, was the largest system in the RPF range. With the new type X 20, BHS has increased the filter area by nearly 20 %. At the same time, the new type has a smaller drum diameter than the C 16 filter, allowing increased operating pressures and reduced maintenance costs.

The rotary pressure filters operate at a temperature of 160 °C and a pressure of 7 bar (g). With a drum diameter of 1.8 m and an active length of 2 m, the system must withstand high loads and is therefore mechanically engineered for demanding applications. BHS uses state-of-the-art calculation and production methods. The result is high-tech mechanical engineering: each of the 35 t filter systems incorporates approximately 20 t of stainless steel.

Pressure-tight chambers

Rotary pressure filters can be used for nearly all filterable suspensions. As high-performance filters, they are excellent for the precise separation of products that are difficult to filter. They also represent well-proven solutions in complex production processes for which other filter methods are not suitable.

The filter drum rotates at a continuously variable speed in the pressure-resistant housing. The surface of the drum consists of filter cells connected to the control head via drainage pipes. During filtration, the solids are retained on the filter medium, forming a filter cake that has a uniform structure and density.

The working zones of the filter are divided by separating elements that are pressed onto the drum pneumatically. This creates individual pressure-tight chambers that enable further treatment of the filter cake. In this way, suspensions, washing agents and filtrates are separated from each other in a precise fashion. By hermetically isolating the various process stages and separating the individual filtrates, cross-contamination between the treatment stages is prevented.

Depending on the design, the filter allows numerous processing steps after the main solid-liquid separation process. These include single or multi-stage cake washing, counter-current or closed-cycle washing, reslurrying, solvent exchanges, steaming and extraction. Since all

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process steps are carried out in isolated chambers within the filter, the filtrates are discharged entirely separately from each other.
Next, the filter cake can be dewatered and, if desired, dried thermally. This typically happens during blow-drying and can be performed using air, nitrogen or other gases.
The cake is output into the atmosphere from the non-pressurised discharge zone. Release from the filter medium is assisted by a pneumatic back-blast or a mechanical scraper if necessary. This unique atmospheric product discharge method is patented. The filter cloth is cleaned in the downstream single or multi-stage rinsing chamber.

Enclosed design

The filter is available with a Center or Twin drive, which makes sure that the drum is always centred in relation to the housing and thus compensates for lateral forces and radial movements of the drum. In conjunction with an appropriate bearing arrangement, this ensures optimum leak-tightness of the system.
Thanks to their enclosed design, these rotary pressure filters are suitable for many applications, especially filtration of volatile or hazardous substances, as well as for sterile processes that require special precautionary measures for reasons of toxicity, workplace hygiene or sterility.
Unlike centrifuges, BHS rotary pressure filters operate continuously. This eliminates the need to invest in additional systems for homogenisation of the product stream and further treatment. Moreover, there are no costs for supplementary equipment such as discharge gates because the discharge zone is non-pressurised.
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MEETS VARIOUS DEMANDS

Applications in the chemical industry

BHS rotary pressure filters process inorganic and organic chemicals such as vulcanisation additives, sodium hydrosulfite, carbonates, phenyls, amines, paraffins, urea adducts or raw materials for detergents. Furthermore, they are suitable for dyes and pigments as well as for pharmaceutical and antibiotics, agrochemicals, plastics, foodstuffs and cellulose products:

- Phthalocyanine, pearlescent or silicate pigments and aniline or anthraquinone dyes are usually difficult to filter. However, when the cake is thin, rotary pressure filters offer high throughput rates, good elution and excellent residual moisture values for these substances, too.
- Pharmaceuticals and antibiotics, such as synthetic or semi-synthetic antibiotics and antibiotic salts as well as herbal active ingredients and extracts, are separated in enclosed rotary pressure filters meeting GMP requirements.
- Fine-grained and coarse-grained polymers and crystals, polyolefins, aromatic acids, acrylic or melamin resins are optimally separated, washed and dewatered using high-performance filters with throughput rates of up to 100 t/h.
- The rotary pressure filters meets strict workplace hygiene standards for toxic products such as insecticides, fungicides, molluscicides or herbicides.
- They also process gently cooking fat, stearins, amino acids, synthetic proteins, lecithins, starch, plant extracts, coffee or vitamins in compliance with food industry standards and without contaminating the product.
- Even products that are difficult to process can be filtered, washed and dewatered in a precisely specified temperature range without gelling. Such products include methylcellulose or microcellulose, CMC and cellulose derivatives.