BENNINGER

Ressource Management for
Textile Finishing.

Ressource Management

UF system for approx. 20 m3/h

A recycling rate of up to 90% of the total amount of waste water accumulated in the process does more than just improve the environmental life-cycle analysis. The purified waste water can be reused in all areas of textile production – including dyeing processes – and is therefore as valuable as bare cash.

A careful approach to a precious commodity

In future, water will become a scarce and hence valuable resource. The increase in demand for this precious commodity grows by a factor of 2, compared to the population growth. During the last 100 years the population has tripled, while water consumption has risen seven-fold. Since 1970 alone, the amount of water available per person has been reduced by 40%.

The pressure on global freshwater reserves is rapidly rising, and the potential for a conflict as in relation to oil may well widen to water in generations to come. No other natural raw material currently faces the same mismatch between the huge increases in demand and its dwindling resources. Experts describe the issues around water supplies as the key challenge for the 21st century.

Textile finishing and water

In the textile finishing industry, the first effects of water shortages and waste water problems are already being felt.

In addition to the recycling of water and other potential recyclables, Benninger Product Line Resource Management also includes the recovery of energy from the waste water. The recovery of this heat is implemented between the ultrafiltration stage and the reverse osmosis.

Ultrafiltration

The hot waste water from textile processes is cleaned of coarse contaminants by means of mechanical pre-filtration and collected in an intermediate tank. With the aid of an ultrafiltration stage, particles are then filtered out down to a size of 0.01µm or a molecular mass of 20 kD, in special applications even down as far as to a molecular mass of 1 kD.

Separation is performed according to the principle of cross flow filtration. In the ceramic membranes, the up to 90°C hot medium flows through the channels of the membrane carrier. All particles which are larger than the pore diameter of the membrane are held back. The particles/molecules accumulate in the concentrate, while the filtrate penetrates through the pores.

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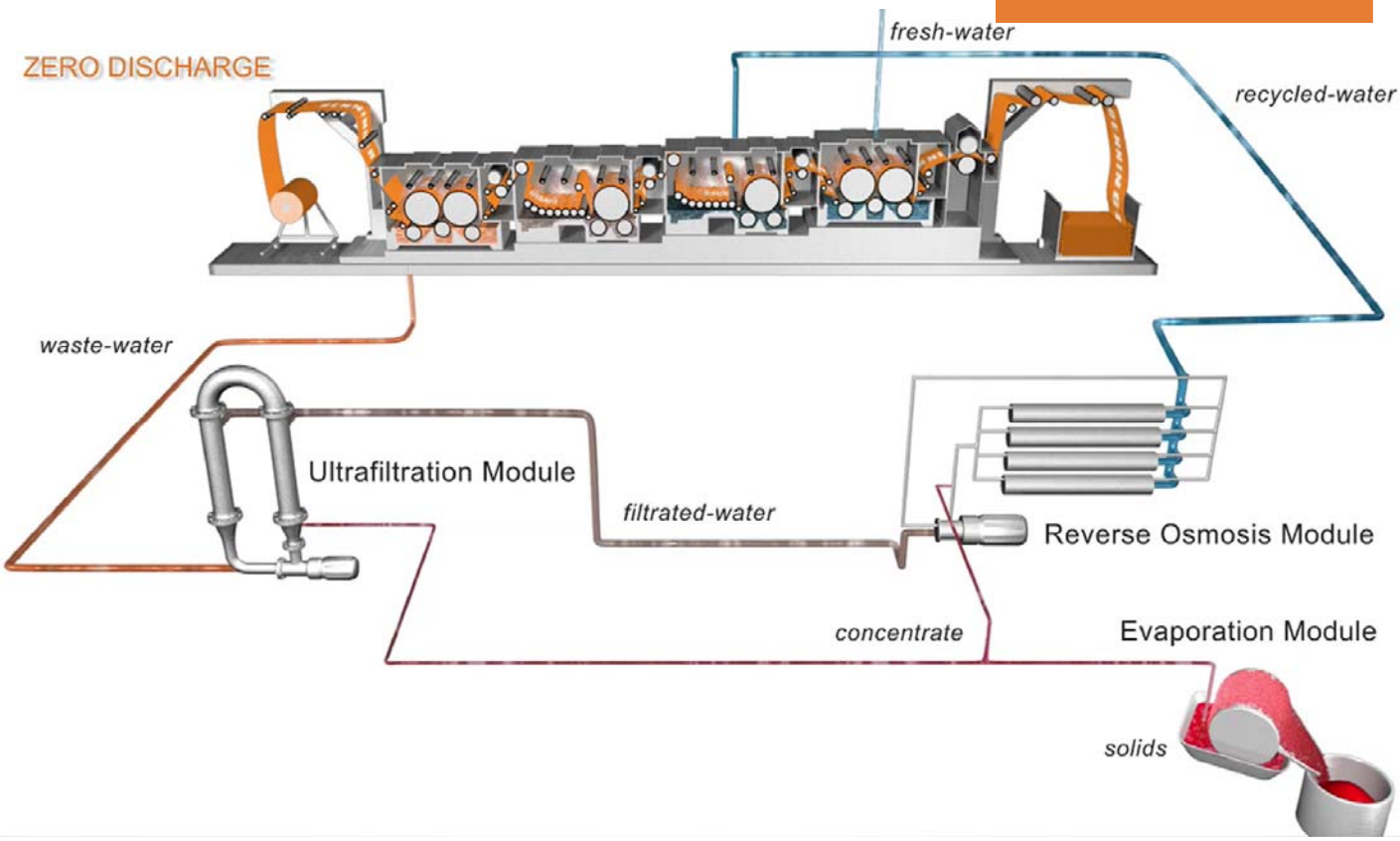
Zero Discharge



The concentrate

A thin covering layer of particles builds up on the membrane, but this is constantly carried away again by the high flow speeds and is thus concentrated in the circulating water, which is extracted as concentrate.

Reverse osmosis

The coloured and salty filtrate of the ultrafiltration is normally fed into a reverse osmosis stage, which is the finest filtration level possible. It can be used down to ion level. Whereas the water can still pass the membrane, salts and other small molecules are held back. Waste water from textile processes is desalinated and decoloured through the reverse osmosis. As a result, there is no reason why the water cannot be recycled in all textile finishing processes

Bulk results

The results show a clear picture:

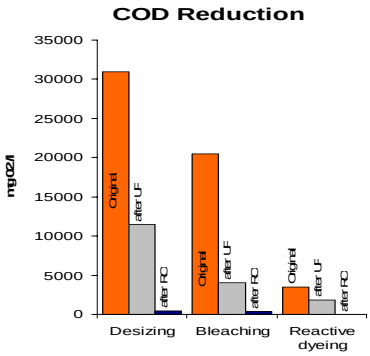
left: Washing liquor from CPB dyeing
right: After filtration

Application examples

- COD reduction of waste water from desizing and bleaching
- Pre-cleaning of mercerizing lye
- Decolouration and desalination of dyeing waste water
- Sizing material recycling
- Indigo recycling
- **Suitable for up to 1000 m3 of waste water per day**

Results

- COD values less than 300 mg/l
- Conductivity less than 200 µS/cm
- Purified waste water is colourless; it can be reused without any problems in the production process



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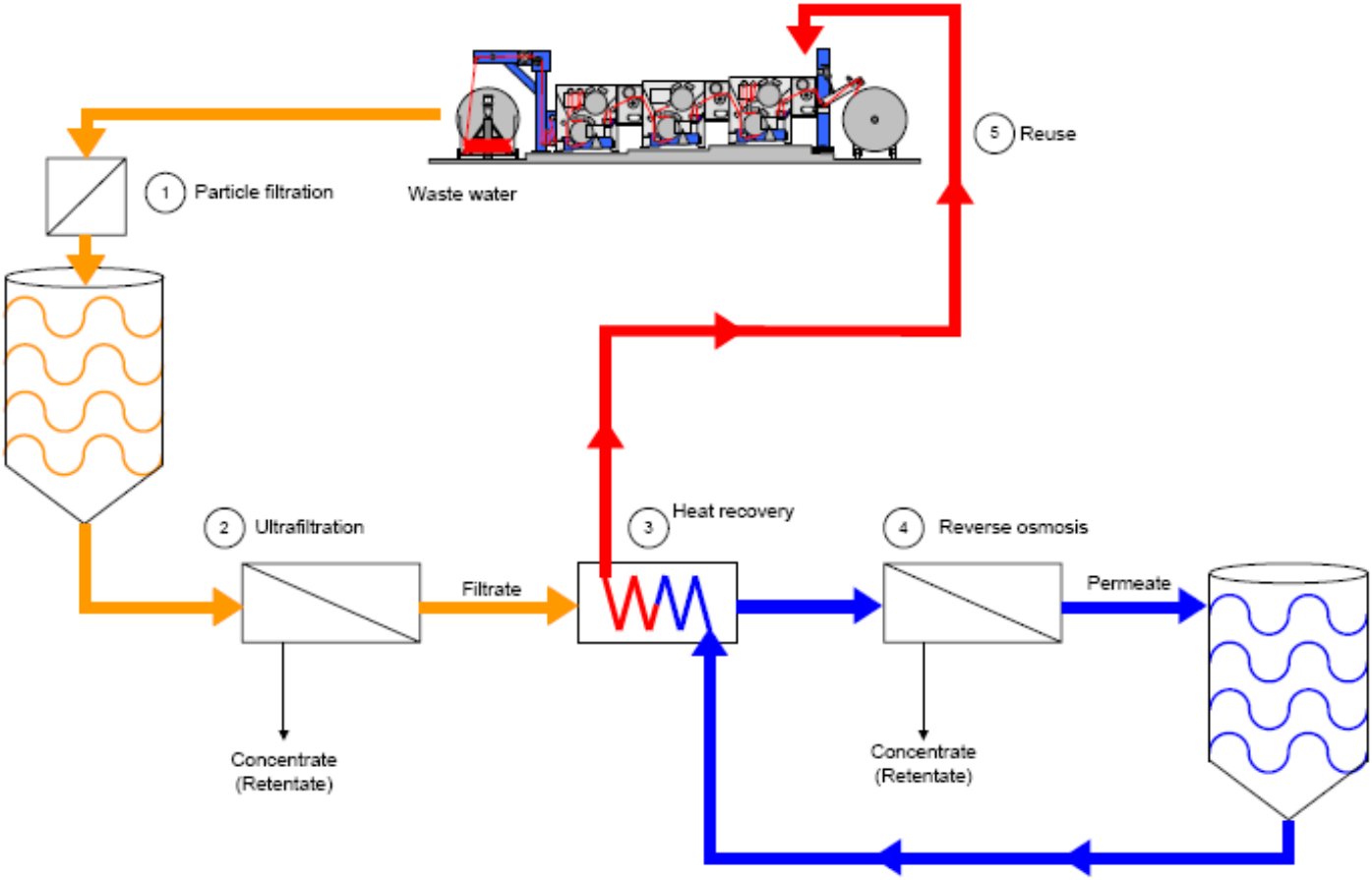
Operating principle of the membrane filtration system



Energy recycling

Ultrafiltration is performed with hot waste water, as the temperature raises the efficiency of the system proportionately. In contrast to this, reverse osmosis filtration is carried out at a maximum of 40°C.

Heat recovery between the two filtration stages has proved itself to be an especially efficient variant of energy recovery. In this system, the water for the reverse osmosis stage is cooled to the required operating temperature.

A closed loop

A part of the electric pumping energy is given off as heat to the filtrate. The energy cycle is closed by using the permeate of the reverse osmosis as cooling water before it is returned to the textile finishing machine. This has the advantage that the recycling water is heated up and can be fed into the textile finishing machine as hot fresh water at a temperature of 75°C. It is possible to use highly efficient heat exchange systems. Thanks to the previous ultrafiltration stage, these heat exchangers hardly get dirty at all, and the efficiency can be kept high for years.

The energy recovery rate is significantly higher here than in standard textile plants.

Advantages at a glance

- 90% water recycling
- 70% energy recycling
- Up to 90% of recyclable materials can be recovered
- Upgradable to waste water-free textile operation
- Independence from public ETP operators

Please call us:

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