PENTAIR

SUSTAINABLE BREWING SOLUTIONS

FOOD & BEVERAGE | SUSTAINABLE BREWING

SUSTAINABLE BREWING

Pentair's sustainable brewing solutions integrate our innovative valve technology, membrane technology for water utilities, carbon dioxide (CO_2) systems, cold block systems, diatomaceous earth (DE)- and chlorine-free Beer Membrane Filtration (BMF), and quality control equipment with all functions of a brewery.

This creates a highly efficient and advanced operation and meets the challenges of today and tomorrow.

Higher costs for raw materials, water, energy, and logistics in virtually every geographical area force our customers to change their investment philosophy and optimize their economies of scale. Because of this, large brewing groups tend to design and built multiple three to five million hectoliter Greenfield operations instead of enlarging existing Brownfield plants to 10 or even 15 million hectoliters.

By introducing non-stop high gravity brewing, a continuous flow and a sophisticated use of membrane filtration, significant savings are realized on raw material usage and water and energy consumption. This highly automated brewing process requires minimal labor, which results in operating cost savings.

A compact footprint with an ideal brewery design lowers investments to the absolute minimum making the decision for new greenfield operations even more favorable.

In combination with Pentair's comprehensive Global Service Management that ensures efficient plant performance, better/more accurate control, better economics, and the most optimal utilization, Pentair's Sustainable Brewing Concept offers a viable, long-term and carefree alternative to conventional services.

DO MORE WITH LESS

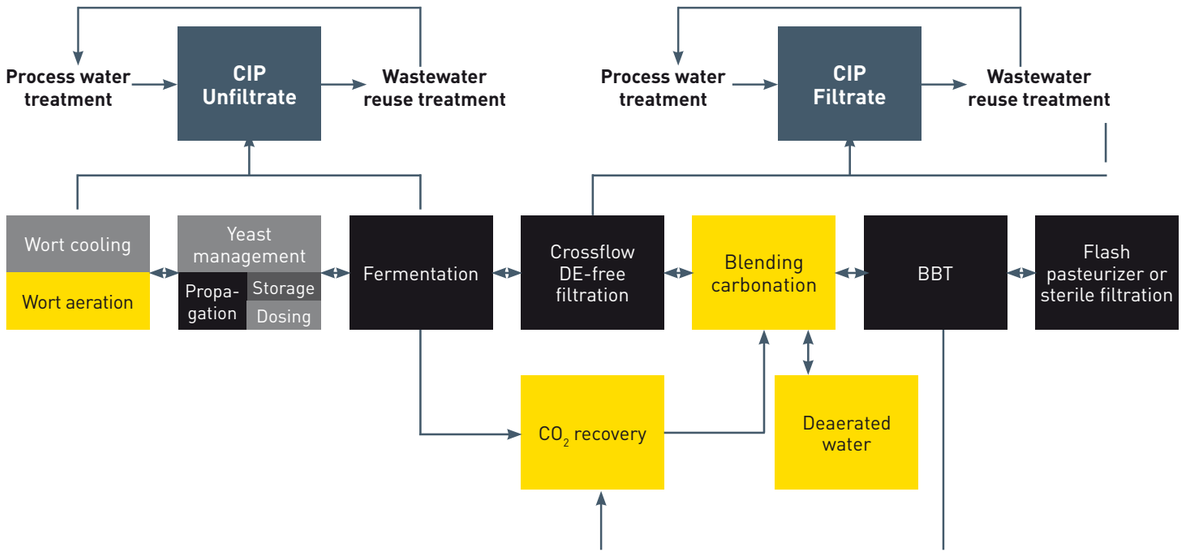
Sustainability means, after all, conducting activities smartly and efficiently in ways that are economical, renewable and repeatable.

Pentair's Efficient Performance Technology philosophy is geared towards product innovations and solutions that offer measurably higher performance and efficiency against competitive pricing.

Developing clean process technologies is an exciting achievement, but it only means something when they are applied in ingenious ways in a customer's plant.

TURNKEY SYSTEMS - INTEGRATION & AUTOMATION

NON-STOP FROM WORT COOLER TO FILLER: FULLY INTEGRATED SOLUTIONS FROM ONE SOURCE



LATEST MIX PROOF VALVE TECHNOLOGY

- Process design with mix proof valve technology improves productivity, reduces product losses and increases plant flexibility allowing you to secure the hygiene and safety of your production process.

PROCESS AUTOMATION

- PLC, e.g. Siemens, Allen-Bradley/Control Logix/Compact Logix, Modicon/Quantum
- Scada, e.g. Winn CC, RS View, GE Fanuc/ iFix, Wonderware/Intouch
- Integrated Systems, e.g. Proleit/ Brewmax, Siemens Braumat/Sistar, Krones/Botec
- Decentralized control options, such as the state-of-the-art IntelliTop® 2.0, offer unique functions for a clear and structured process setup and contribute to the performance and efficiency of a plant

APPLICATION

- Control application software developed in accordance to ISA S88.01

COMPLETE ON-SITE SOLUTIONS

- Turnkey fermentation and beer processing plants, pressure tank cellars with panel technology, pipe fence, or double seat valve technology

BEER PROCESSING

BEER MEMBRANE FILTRATION

The brewing industry has passed the sustainability point of no return. Having reached its maximum potential, the industry is quickly leaving conventional solutions behind in favor of clean process technologies that satisfy ever-increasing expectations in terms of quality, sustainability and flexibility at, of course, lower cost levels.

Pentair's Beer Membrane Filtration (BMF) system establishes a sustainable brewing process and a matching working environment void of the health and safety risks that were present in the DE era of filtration. The 'Pentair Real' cleaning procedure combined with the optimized backflush intermediate cleaning procedure, cuts water consumption by more than 50 percent, which is well in line with, or even above, the water savings targets that most breweries have set. And since the goal is to produce the best quality beer, one cannot overlook BMF's measurable improvement to the beer's taste and colloidal stability.

Cost comparison	BMF	DE
Beer losses	•	•
Maintenance and service	•	•
Solid waste disposal	•	•
Labor	•	•
Stabilization with silica gel	•	•
Separator	NA	•

FLASH PASTEURIZER OR STERILE FILTRATION

More stability and a longer shelf life for liquid products can be achieved with either flash pasteurization or sterile filtration. With flash pasteurization, the pump block, heat exchanger and holding section are designed as three single skids that work together and are automated as one unit. If required, a buffer tank can be added to this unit.

For particle reduction or sterile filtration a fully automated filtration unit, which allows for steam sterilization, Cleaning-in-place (CIP), integrity testing, and CO_2 overlay, is offered. Custom-made systems with additional features are available on request.

PLUG-AND-PLAY SYSTEMS

- Yeast storage and propagation
- Swing-bend panels
- Tank-top equipment
- Water deaeration
- Pigging
- CIP

HIGH GRAVITY BREWING

High gravity brewing is used to increase the production capacity without investing in larger brew houses, fermentation tanks, filtration lines, and overall footprint. The high gravity brewing process involves the production of highly concentrated wort and the dilution of the final beer.

The main steps are water deaeration, blending of the high gravity beer with deaerated water, dosing, and finally the carbonation of the blended beer to meet the sales CO_2 content. Deaeration, blending, dosing, and carbonation can be combined in one single skid.

Custom-made systems including all necessary units, pipework and valve manifolds can be designed for larger capacities.

PLUG-AND-PLAY SYSTEMS

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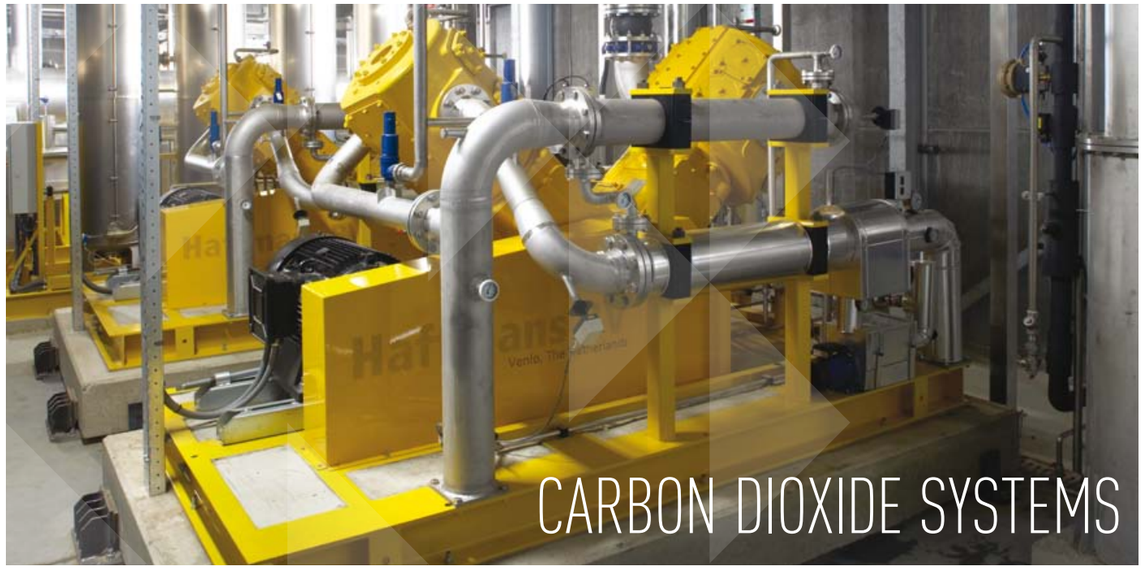
WATER MANAGEMENT

When assessing and reducing the environmental footprint of a brewery, one focus area is the reduction of the water footprint. Because water is essential to the brewing process, both as an ingredient and in the production process, it must be given special attention. Pentair's expertise in water use and its wide range of technologies provide the ideal solutions for brewery water management.

- A Water Audit determines the current water usage and water streams in a production plant and highlights opportunities to reduce overall water consumption.
- Process water polishing prepares product water to comply with the specific needs of a brewery utilizing membrane technology and activated carbon (decolorization and THM removal).
- Wastewater treatment with Membrane BioReactor (MBR) technology provides better water quality, smaller footprint, less sludge, adherence to regulations and reduced handling costs when compared to conventional wastewater treatment.
- Effluent polishing prepares effluent for specific process requirements with activated carbon or membrane treatment.

		Typical water consumption in a modern brewery		Pentair's optimal water balance
Water type	Usage	%	hl	hl
Brewing water	Brewing	30	1.2	1.2
Brewing water	Process cleaning	17.5	0.7	
Soft water	Bottle/keg cleaning	20	0.8	
Plant water	General service	10	0.4	0.4
Denim water	Boiler feed	2.5	0.1	0.1
Flush water	Rinse/concentrate from RO/IEX	20	0.8	0.8
TOTAL		100	4.0	2.5



CARBON DIOXIDE SYSTEMS

CO_2 SYSTEMS

CO_2 is an essential ingredient in both beer and soft drinks and has a large influence on the quality and customers' acceptance and perception of the product.

In most breweries CO_2 recovery is common practice. Advanced breweries look to early CO_2 recovery whereby they are able to recover food-grade CO_2 from fermentation and become CO_2 self-sufficient.

In addition, they can sell excess CO_2, for example, to beverage producers for the production of carbonated soft drinks. All of this is done with a minimum consumption of utilities.

HEAT RECOVERY SYSTEM LIQUIVAP

A CO_2 recovery plant consists of several units, of which CO_2 liquefaction and evaporation units account for a large portion of the plant's energy consumption.

With LiquiVap, the required energy can be reduced by up to 60 percent. Effectively, it simultaneously facilitates the liquefaction of incoming CO_2 gas (from the fermenters) and vaporization of incoming liquid CO_2 (from the storage tanks).

CO_2 AS A REFRIGERANT

For the production of liquid fermentation CO_2, the CO_2 has to be cooled to -24 to -34 °C. Therefore, a CO_2 recovery plant is usually equipped with a cooling plant that typically uses ammonia (NH3) or Freon as a coolant.

Because of the environmental disadvantages of these cooling agents, the non-corrosive nature of CO_2 as refrigerant makes it safe for workers to use and for the environment. In addition, it offers excellent thermodynamic properties.

QUALITY CONTROL EQUIPMENT

A good definition for a quality beer is a beer that consistently meets specification. To ensure consistency of the required specifications each step of the production process in a brewery should be controlled, starting with the arrival of raw materials, through production to the analysis of beer samples taken randomly among bottles and cans in the holding room. Pentair has solutions for the following quality control aspects:

- Total CO_2 and O_2 management (in-line, at-line and lab)
- Foam measurement (lab)
- Turbidity measurement (in-line and lab)
- Alcohol/Extract measurement (in-line)
- Monitoring of downstream processes such as pasteurization or keg/bottle washing (in-line)

In addition to individual pieces of equipment Pentair offers a Total Lab Solution (TLS). Each TLS project is customized, whether it is upgrading an existing lab or part of a new brewery. A TLS can include layout, design and equipping of the laboratory, in-house training, and commissioning of the project. In a comprehensive sweep, Pentair provides or sources the supply of lab furniture, quality control equipment, glassware, consumables, chemicals, and anything else a customer may need. The advantage of a TLS project lies with the expertise that Pentair provides by overseeing the entire project from concept to commissioning to after-sales service with advanced operator training courses in the area of preventive maintenance.

Inpack TPO/CO_2 Meter, type c-TPO

GLOBAL SERVICE MANAGEMENT

Today, service is much more than just repair and maintenance. Service contracts are an integral part of your preventive maintenance program. It begins during project management when Pentair's service team is introduced to the customer and assists with commissioning.

On-site the service team gathers valuable information about the local conditions of the operation. With performance data monitoring, we are able to acquire long-term information, which ensures that troubleshooting and service activities can be very efficient if an emergency occurs.

By taking advantage of the full service contract a company can be assured that the potential for continuous improvement of a plant is explored on a regular basis, and thus place its focus on the core business.

Pentair's life cycle/service management is divided into two phases: design and operation. Proposal/planning, contract management, and engineering up to commissioning are typical design services.

Start-up, monitoring, consulting (24/7 helpdesk), maintenance/replacement of components, evaluation, and optimization are part of the operation services. The overall goal is to ensure that a plant is constructed and operates in the best possible and most cost-efficient way.

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