



SUSTAINABLE BEVERAGE PLANT



SUSTAINABLE BEVERAGE PRODUCTION

In an increasingly competitive marketplace that has seen the consumption of non-alcoholic beverages grow rapidly, producers must find highly flexible and sustainable processes.

As the variety of beverages has expanded to include carbonated soft drinks, mineral and bottled water, juices, energy, and health drinks the entire industry is challenged, especially due to the rather short shelf life of some of these products.

Higher costs for raw materials, water, energy, and logistics in virtually every geographical area force the industry to change their investment philosophy and optimize their economies of scale.

Non-alcoholic beverage producers are focusing on consistent quality, cost competitiveness and sustainability. These important initiatives are resulting in the need for continuous and fully-automated production facilities with cost-efficient and environmentally friendly systems.

Pentair meets these challenges with an integrated and sustainable beverage production concept. It is based on innovative valve technology, membrane technology for water purification and filtration, continuous beverage processing, carbon dioxide (CO₂) purification, liquefaction and storage, and quality control equipment to create a highly efficient and advanced production operation.

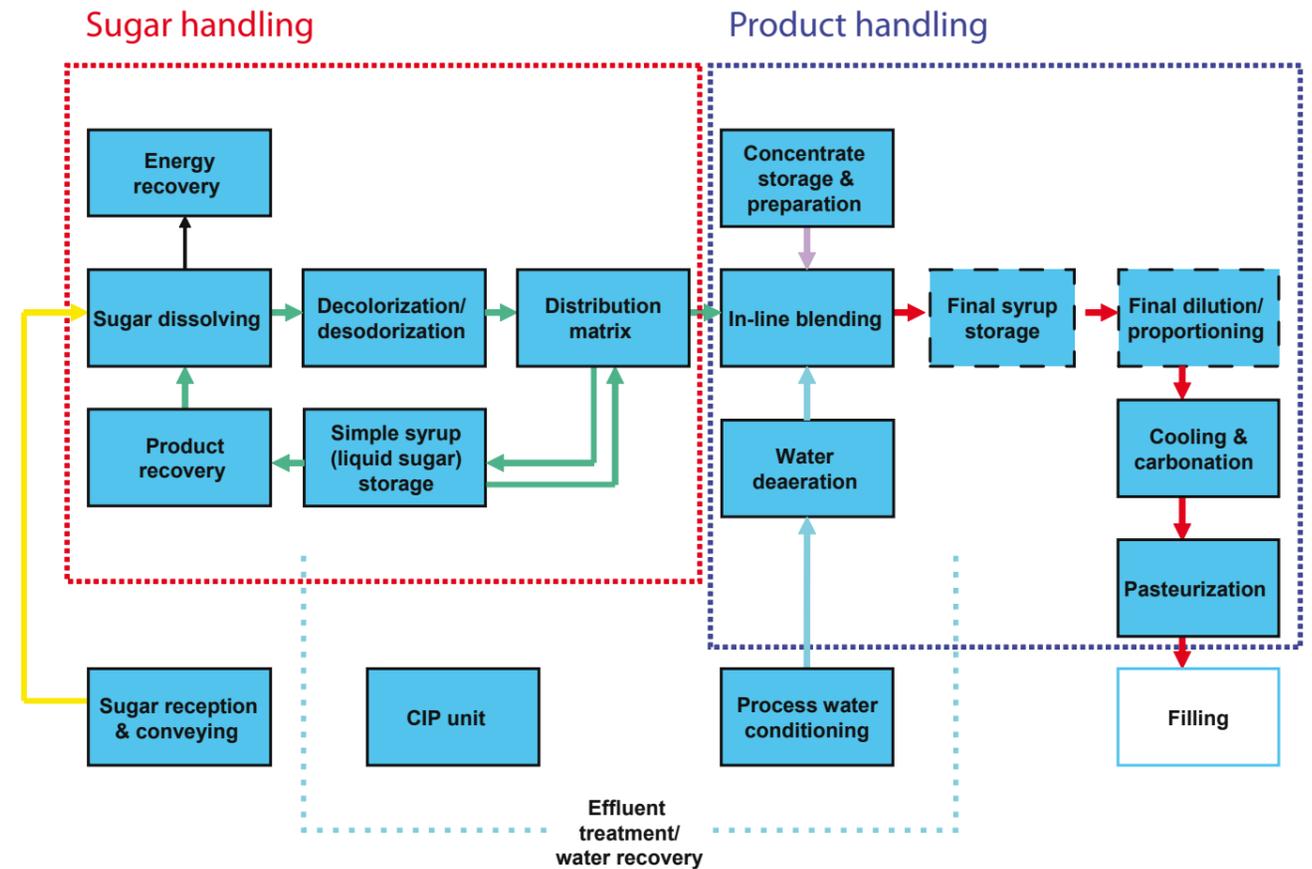
Pentair's sustainable beverage plant concept is designed to provide beverage producers with a total process solution that will:

- Reduce CAPEX & OPEX
- Minimize CO₂ footprint
- Reduce environmental impact

Examples of how Pentair's various technologies are applied include:

- Sugar dissolving and multi-stream in-line blenders for continuous production
- Next generation heating and cooling systems to cut energy cost
- Accurate in-line and laboratory quality control equipment
- Ultrafiltration (UF) and reverse osmosis (RO) for reduced water consumption
- Membrane BioReactor (MBR) system for reuse of process water and recycled wastewater
- Advanced valve technology to optimize plant performance and minimize product losses
- CO₂ and O₂ management systems that fulfill the demand on high quality and reduced total cost of ownership

MAIN STEPS OF A TYPICAL SOFT DRINKS PLANT



TURNKEY SYSTEMS INTEGRATION & AUTOMATION

Automated CIP systems

- Individually designed to suit customer requirements or supplied as standard units
- Conform to modern industry standard design concepts
- Multiple circuits and tank designs, complete with recirculating or in-line heating or a combination of both
- Automation systems with process variables data recording, trending and traceability
- Siemens or Allen Bradley based control systems
- Complete process design, installation & commissioning
- Conforms to ISO, EN, FDA & EHEDG guidelines & regulations

PROCESS AUTOMATION

Latest Mix Proof Valve technology

- Process designs with mix proof valve technology improve productivity, reduce product losses and increase plant flexibility thus maximizing process hygiene, safety and sustainability
- Decentralized control options, such as the IntelliTop® 2.0, offer unique functions for a clear and structured process setup and contribute to the performance and efficiency of a plant





CONTINUOUS BEVERAGE PROCESSING

CONTINUOUS MULTI-STREAM BLENDING

Continuous in-line blending is utilized for finished product applications in the beverage industry. Pentair systems keep product losses to a minimum. In a constant ratio, the various liquid components are already mixed in the pipeline. Homogeneous blending of products with high viscosities is ensured by using static mixers.

The innovative In-line Multiblender is capable of mixing several products continuously and simultaneously and conveying the beverage directly to the filling line. The system is space-efficient because several filling lines can be fed with one unit and only one buffer tank is required. The unit's multiple recipe management with fast product changes allows for the highest process flexibility. Efficient control loops reduce energy consumption to a minimum.

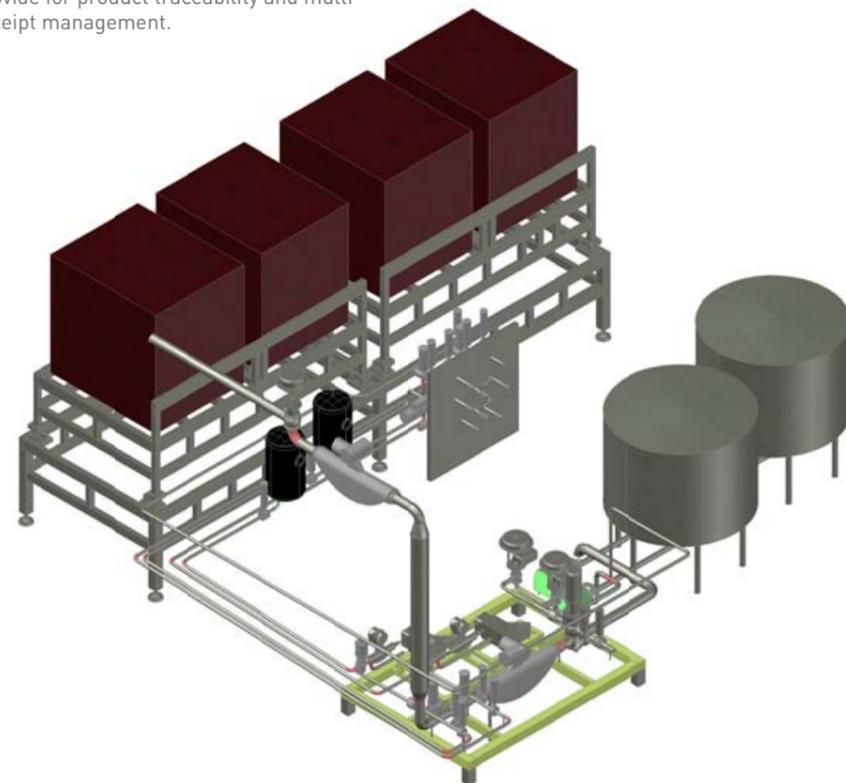
CONTINUOUS CRYSTAL SUGAR DISSOLVING

Products with a pH value in the range of 6 to 7, carbonated or non-carbonated products, and those containing pulp and fibers are very sensitive. Pentair's extensive range of aseptic valves and aseptic process systems that provide a continuous analysis of the sterility, are ideal to meet the ever-demanding safety standards for sensitive products.

AUTOMATED AND FULLY-INTEGRATED SYRUP ROOMS

Pentair's continuous or batch multi-stream blending and carbonation, process water deaeration systems, and powder dissolving systems are designed to achieve significant savings on raw material use, and water and energy consumption.

The highly automated beverage process requires minimal labor, which results in additional operating cost savings. A compact footprint with an ideal beverage plant design lowers investments to the absolute minimum. The control systems provide for product traceability and multi-receipt management.



ASEPTIC PRODUCT PROCESSING

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WATER TREATMENT

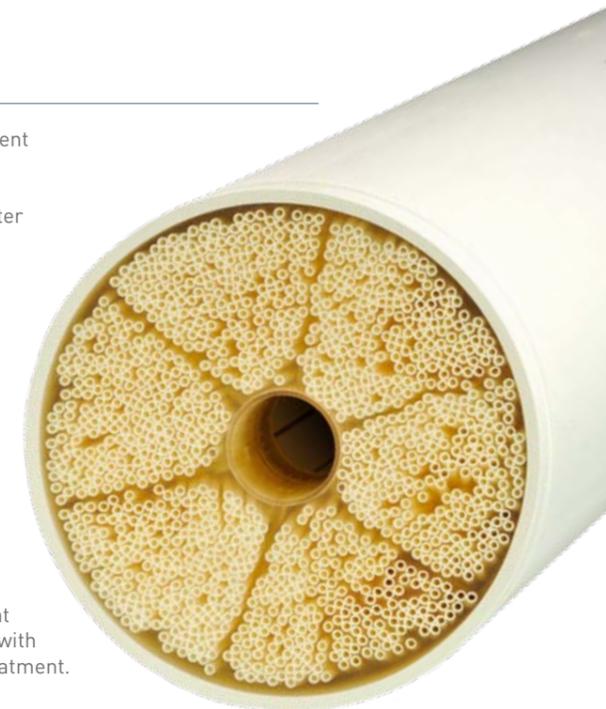
WATER MANAGEMENT

When assessing and reducing the environmental footprint of a beverage production plant, one focus area is the reduction of the water footprint. Because water is essential to beverages, 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 solution for water management in non-alcoholic beverage production plants.

- 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 production plant utilizing membrane technology and activated carbon.
- Wastewater treatment with MBR technology provides better water quality, a 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.

PILOT PLANT SAND FILTRATION FOR MINERAL WATER

Before investing in a full-scale sand filtration plant that removes unwanted alkaline soil particles and deaerates methane and sulfide through the headspace, setting up a pilot plant allows for testing under production parameters. Then the collected information is used to design a tailor-made plant, which meets the specific needs of the customer.





CARBON DIOXIDE SYSTEMS

CO₂ – THE SPARKLING ELEMENT IN BEVERAGES

Carbon dioxide (CO₂) is the sparkling element and important ingredient in carbonated soft drinks, mineral and bottled water. In the production process CO₂ is added both to the beverage and used as a protective atmosphere during bottling, canning or transportation of the product.

The CO₂ used in the beverage industry usually originates from two sources – fermentation or generation.

Pentair Haffmans is a specialist in Total CO₂ Management and delivers reliable solutions for the purification, liquefaction and storage of CO₂, all of which help beverage producers assure product quality, reduce operating costs and support a sustainable future.

GREEN CO₂ FROM FERMENTATION PROCESSES

Carbon dioxide is recovered in most breweries, but it is also produced as a by-product in distilleries and bioethanol plants. Pentair Haffmans' High Low Purity (HLP) plant allows for the recovery of food-grade CO₂, which provides independence from the CO₂ market (breweries) and/or an extra source of income. A CO₂ recovery plant consists of several units, of which CO₂ liquefaction and evaporation units account for a large portion of the plant's energy consumption.

With Pentair Haffmans' LiquiVap heat recovery system energy requirements can be reduced by up to 60 percent. Effectively, it simultaneously facilitates the liquefaction of incoming CO₂ gas (from the fermenters) and vaporization of incoming liquid CO₂ (from the storage tanks). Besides supplying the equipment and technologies for Total CO₂ Management and CO₂ Recovery, Pentair Haffmans helps producers and consumers of food-grade CO₂ connect with each other and explore the possibilities of establishing partnerships.



QC EQUIPMENT

A good definition for a quality beverage is one that consistently meets specification. To ensure consistency of the required specifications, each step of the production process in a beverage plant should be controlled, starting with the arrival of raw materials through the analysis of packaged product samples. Pentair has solutions for the following quality control aspects:

- Total CO₂ and O₂ management (in-line, at-line and lab)
- Brix 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 to upgrade an existing lab or as part of a new beverage plant. As needed, a TLS can include the design and supply of the laboratory, in-house training, and commissioning of the project. In a comprehensive sweep, Pentair delivers 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 preventive maintenance training for operators.



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.



FOOD & BEVERAGE

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