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Superior Craft Beer Filtration With Jumbo Star Systems

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Abstract

The global craft beer market has been steadily growing for many years, reaching a production in excess of 75 million hl which represents a 4-percent share of the overall beer market worldwide.

Over recent years craft breweries have been increasingly introducing a clarification step in their beer production process. Sartorius can offer filtration solutions to meet the demands of small- medium- and large-sized craft breweries.

The Jumbo Star system, with its large filtration area, small footprint, and ease of use, is the optimal solution for craft beer clarification.

Find out more: www.sartorius.com/food-and-beverage

Introduction

By the end of 2019, there were about 850 craft breweries in Italy, with a total annual production in excess of 600,000 hl, of which 75 percent were top-fermentation and 25 percent bottom-fermentation beers.

Microbrewery capacities are highly variable, ranging from small concerns producing a few hundred hl/year to big establishments that can produce up to 15–20,000 hl/year. Recently, an increasing number of craft breweries have realized the importance of beer filtration in their production processes.

Sartorius Jumbo Star systems are the ideal solutions for beer clarification by small- to large-size breweries. Systems are based on the Jumbo Star filter cartridges that offer distinct benefits over standard cartridges:

- Large filtration area for increased filtration capacity with high flow rates.
- Robust cartridge structure and wide chemical compatibility of all materials for the highest efficiency even after many chemical regeneration and back-flushing cycles. This results in reduced filtration costs: at least 50 percent lower than standard cartridges at the same installed filtration area.
- Small-footprint filtration systems that are easy to operate and handle.



Craft Beer

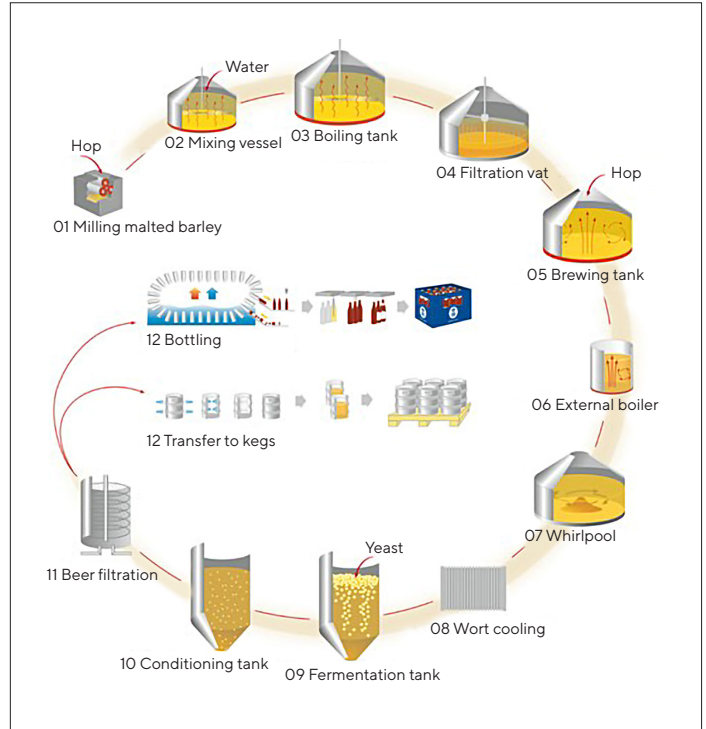
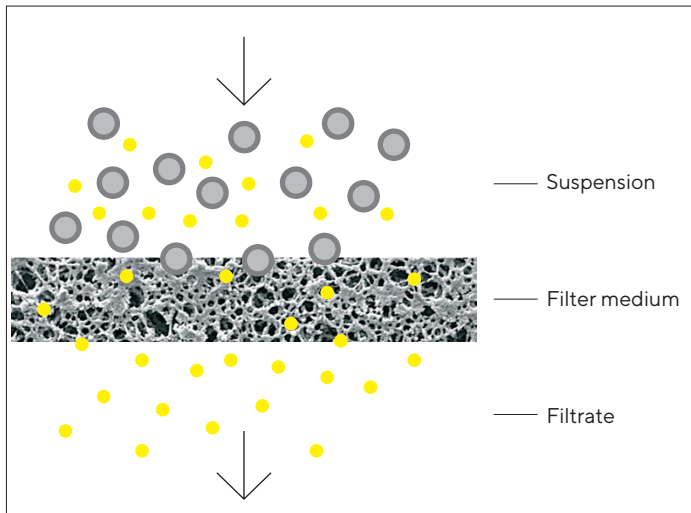


Fig. 1: Standard craft beer production

At the end of fermentation, beer is very hazy and is conditioned at low temperature in maturation tanks for 15 to 30 days depending on the type of beer and the raw ingredients. This rest period brightens and clarifies the beer as suspended yeast and hops gradually leave sediment on tank bottoms. The time needed to obtain the desired clarity varies considerably, depending on the type of beer (bottom- or top-fermentation), type of yeast and other ingredients, type and amount of hops, mashing vessel characteristics, filtration, and fermentation.

Filtration is defined as “a physical process that separates solid particles from a liquid or gas passing through a porous medium.”



Through filtration it is possible to partially or completely remove suspended particles, reducing beer conditioning time and accelerating commercialization. Advantages for producers include:

- Reduced manufacturing cost (shorter product storage time, refrigeration energy savings).
- Increased production capacity.
- Enhanced product with chemical | physical properties that remain stable over time.



Jumbo Star Advantages

Sartorius can supply small- to large-sized craft breweries with filtration solutions that ensure the production of a beer with the desired clarity, without affecting its organoleptic and sensory properties.

The Jumbo Star systems are especially suited to small- and medium-size craft breweries. Jumbo Star cartridges filter material pleating technology results in as much as 28 m² of filtration area for each 40-inch module (Fig. 2).

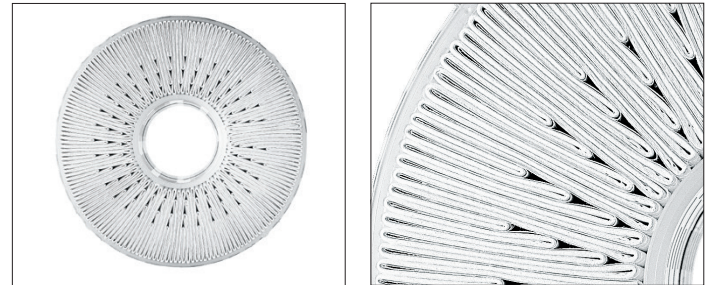


Fig. 2: Jumbo Star cartridge filter pleating technology

Jumbo Star systems offer advantages that make them the ideal choice for beer filtration:

▪ **Respect for Product Quality**

The filtration system is stainless steel and uses all-polypropylene Jumbo Star cartridges. The completely inert material does not affect product quality, and the closed system can be oversaturated with CO₂ before filtration to minimize oxidation risk.

▪ **Choice of Final Product Clarity**

Filters are available in a wide range of retention rates (from 20 to 0.45 μm). Our experience shows the best filtration autonomy and filtered product quality can be obtained with nominal pore sizes of 8 μm and 5 μm.

▪ **Excellent Hygienic | Sanitary Standards**

The high mechanical resistance and chemical compatibility of the systems' construction material makes it possible to clean, regenerate, and sanitize the entire system efficiently. Breweries can prevent microbiological contamination with chemical agents, hot water, or steam.

▪ **High Filtration Autonomy**

Depending on the type of beer, the Jumbo Star cartridge 28 m² filtration area allows uninterrupted filtration of 100 hl or more at flow rates of 25–40 hl/h. This reduces downtime needed for cleaning as well as water and sanitizer consumption.

▪ **Centrifugation Alternative**

Jumbo Star systems are a valid alternative to centrifugation, offering the advantage of enhanced economy (considering both purchase price and handling costs) with the same throughput and still respecting product quality.

- **Low Filtration Costs**

Filter geometry and large filter adapter diameter (DN100) allows back-flushing with the right flow rate, optimizing regeneration efficiency. Filter efficiency and autonomy are fully recovered at the end of filtration.

- **Reduced Product Loss**

By optimizing static and dynamic draining processes at the end of filtration, the systems reduce beer loss to negligible levels.

- **Versatility**

Jumbo Star systems can be manual, semi-automated or fully automated, with one or more filtration stages. The design can be customized according to required filtrate volumes and throughput. They are suitable for beer filtration at atmospheric pressure or under isobaric conditions.

- **Efficiency and Ease of Use**

All Jumbo Star systems are designed to be used intuitively by operators with little experience.

- **Green Technologies**

Jumbo Star technology has been developed to ensure a reduced environmental impact via a feed pump with inverter and calorie recovery through heat exchangers for hot water production. Backflushing with pulsation, combined with an adequately dimensioned washing pump, allows reduced water consumption for cleaning and regeneration. The systems also feature very low energy consumption and noise level.

- **Compact Size**

The compact size is optimal for use in microbreweries where space is limited. The systems are built on stainless steel skids and can be rolled along easily.

- **Remote Service and Data Recording**

Automated and semi-automated systems can also be remotely operated and monitored and can make possible acquiring and storing process data (e.g., volume filtered, average throughput, number of cleaning cycles, water and chemicals consumption).

Manual Solutions



Semi-Automated Solutions



Fully-Automated Solutions



Conclusion

Cartridge filtration is an ideal solution for craft breweries. Jumbo Star systems are a valid and profitable alternative to the centrifuge.


- Fully or semi-automated systems are ideal for large breweries with an annual production in excess of 5,000 hl and filtrations of 100 hl/batch or more.
- The manual version is perfectly suited to medium-size breweries producing 1,000 to 4,000 hl/year with filtrations of ca. 20 to 80 hl/batch.
- For smaller breweries with an annual production of less than 1,000 hl and filtrations of 10–20 hl/batch, a cartridge filtration system can be sufficient (two stages with eight cartridges each).

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