SIMPLE, YET EFFECTIVE

Removing hops sediment after dry hopping

The trend toward hop-heavy beers continues, with dry-hopping as the go-to procedure for adding enhanced aromatic and flavor notes. As the principle trendsetters, US microbreweries will typically add an average of 500 g of hops per hl. Either hops or hop pellets can be used, whereby the latter tend to deliver a wider range of aromas. The extraction of essential oils from hops flowers is a lot more difficult than from pellets, which dissolve more readily, even in cooled brew [1]. Both materials present the same problem of particles binding a significant quantity of beer, leading to volume loss. This article attempts to address the issue of reducing these losses through the proper deployment of a Beer Cleaner [2, 3].

The Beer Cleaner is an obliquely oriented sieve, through which beer from a small preliminary chamber runs continuously, uniformly moistening the entire surface, then depositing the particles onto a horizontal catch. By means of slots arranged transversely to the flow direction, with a width of 250 µm, the beer is separated from the bulk of the hop particles. This process works without wasting any mechanical energy. The slots don't get blocked since the continuously flowing beer ensures a self-cleaning effect.

The screen is designed for a maximum operating pressure of 1.5 bar. Thus, before separation, air can be displaced from the container by means of CO_2 and pressure applied to the bearing tank can be adjusted. As shown in figure 1, the dry-hopped beer can be either pumped into the feed chamber or flow alone due to a small pressure drop between the storage tank and the Beer Cleaner. The liquid flows through the screen slots while the hop particles slide down onto the catch.

In the less steep lower part of the sieve, these components remain somewhat longer and can drain further. This allows additional reduction of beer loss. Solid particles gradually slide further toward the end of the screen, dropping onto the lower part of the container from where they can be easily discharged. The beer then passes into a container arranged under the strainer, which is equipped with an automatic level indicator. The switching signal to empty the container is passed on to a pump, which finally delivers the "clarified" beer into another tank.

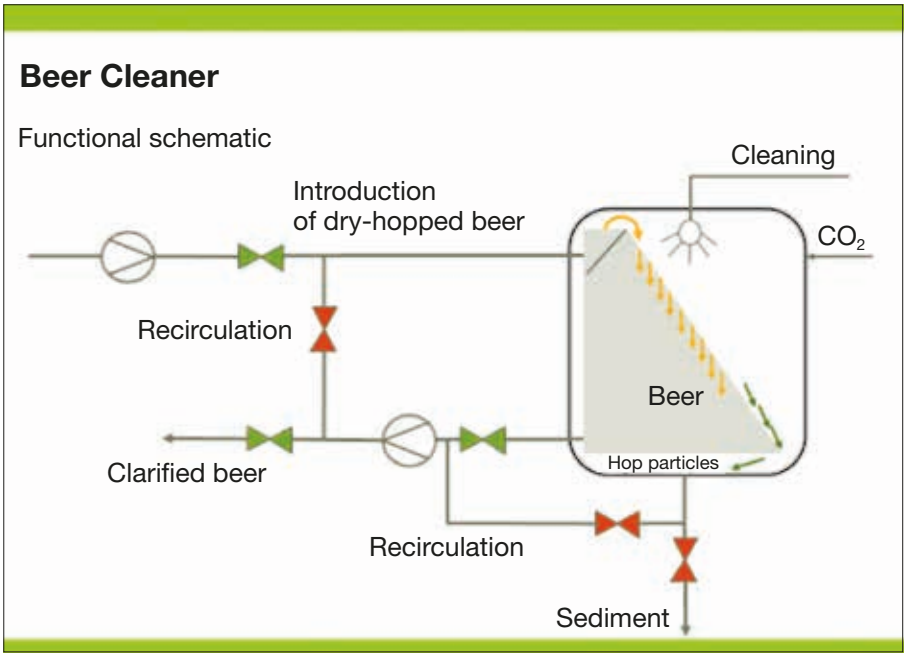

Fig. 1: Beer Cleaner function

The Beer Cleaner at work

In order to produce an image of the separation process (Fig. 2), the screen is shown operating without pressure. Water was substituted for beer in this demonstration, and dry-hopped with 1 kg of pellets/hl. The resulting effect is comparable to the experiments carried out with beer. Figure 3 from the same experiment shows the comparison of the samples in a separating funnel in front of and beyond the Beer Cleaner.

Since it takes time for the initial flow rate to be properly adjusted at the start of operation, if the beer flow is too strong, it can overflow into the lower solids container, where two valves are ready to pump it back into the flow chamber. Proper flow rate depends entirely on the amount of hops pre-

Willi Mitter, Frank Peifer, Sandro Cocuzza

Hopsteiner, Mainburg

sent in the beer. For a sieve with a width of 65 cm, 25 hl of beer dry-hopped with 300 to 400 g of pellets per hl allows up to 25 hl of beer per hour to flow.

For tests with up to 1.5 kg of pellets per hl, throughput is significantly reduced to about 12 to 13 hl per hour. We currently have a Beer Cleaner with a larger surface area (width 100 cm) in production, which can be operated with up to 400 g/hl of dry-hopped pellets at a flow rate of approx. 40 hl/h.

Figure 3 clearly illustrates the difference before and after sending the beer flowing through the Beer Cleaner. Substantially fewer and significantly smaller solid particles can be seen in the treated beer.

The Beer Cleaner can also be used to re-capture beer from saturated sediment. That is, it is not necessary to discard a larger quantity of sediment from the tank cone or tank bottom in advance. Even batches with sludge-like consistency can be set to flow directly across the screen. While flow rate is greatly reduced, at least some volume of beer can be "saved" by this method.

The Beer Cleaner can be used at any time during the process. If, for example, the beer has been dry-hopped using any kind of apparatus, the hops can be left in solution for a week or two after completion of the extraction process before the charge is sent through the Beer Cleaner.

Fig. 2: Hops particles being separated in the Beer Cleaner

Fig. 3: Comparing the results in front of and beyond (left) the Beer Cleaner

It is also possible to send the beer through the Beer Cleaner immediately after the extraction process, then pump the beer into a storage tank for the required time.

A more homogenous hoppy aroma can be achieved in the tank in the absence of sediment, which would otherwise lead to a higher concentration of aromas in the lower range.

If the brew is to be filtered, it is advisable to centrifuge the beer beforehand in order to remove fine particles below 250 µm. Precleaning in the Beer Cleaner ensures uniform feeding of the centrifuge without great variation in particle size, which means that fewer technical problems arise during the separation process.

Fig. 4: Hops sediment after separation

Conclusions

In summary, it can be stated that particle separation in the Beer Cleaner is accomplished without moving parts and thus without energy input. Due to the self-cleaning effect as a result of a steady flow of beer, the slots in the screen are not clogged. Due to settling time of the particles in the lower region of the sieve, the solution is drained, which further reduces beer loss. Even the initial hectoliters from the tank containing the entire amount of hops in any form can be run through the Beer Cleaner, with somewhat reduced flow. Overall, this apparatus is an uncomplicated, energy-saving module which serves to efficiently remove hop particles for small and medium-sized breweries. □

Hopsteiner at drinktec:
Hall B1, Booth 129

References:

[1] Mitter, W., Cocuzza, S.: Die Kalthopfung – Untersuchung verschiedener Parameter, Brauindustrie 11/2012, page 74

[2] Patent Registration EP 15003168, November, 2015

[3] Mitter, W., Peifer, F.: Reduction of beer losses after dry hopping by using a special sieve, Poster Trends in Brewing, Gent, 2016