A compact brewhouse system for 21 batches/day

SIMULTANEOUS LAUTER WORT HEATING AND WORT BOILING

In planning the brewhouse of the future, it must be taken into consideration that the trend towards brewing a larger number of batches per day is on the rise, essentially reducing the amount of grist per batch. Increasing the number of batches per day and reducing the size of the batches addresses the need to minimize energy peaks and could also result in significant savings due to the smaller dimensions of the brewhouse equipment. In general, to achieve a higher batch count per day necessitates the installation of additional vessels in the brewhouse.

THE COMPACT BREWHOUSE PRESENTED HERE is designed to produce **21** batches per day with a wort boiling system selected specifically for this purpose (see fig. 1). With this number of batches, the volume of the cast-out wort is reduced by 2/3. which allows for the size of the brewhouse vessels to be reduced by 2 / 3 as well. In order to brew 2] batches per day utilizing a single decoction process, six mash vessels are required. For the lautering process, three lautering vessels and three lauter wort collection vessels are necessary (Three are needed because lauter vessels designed to lauter over ten batches per day are overly dependent upon malt quality and do not offer the desired degree of certainty required for daily operations). A total of twelve individual vessels are needed for the mashing and lautering processes. Comparatively, the number of vessels in the brewhouse depicted here is reduced by half if the vessels are “multipurpose”. This is possible if three integrated brewhouse vessels, each consisting of a healed mash tun and a lautering vessel, and three combination vessels, serving as both a mash tun and a wort collection vessel, are utilized.

Integrated Brewhouses

In contrast to two-vessel brewhouses, an integrated brewhouse also includes a lautering vessel, which is located concentrically around the mash tun. Since the inner walls of the lautering vessel is, in part. also the outer walls of the heated mash tun, the heat radiating from the mash tun helps prevent the mash in the lautering vessel from cooling, which is advantageous for the lauterin g process.

Overheating the mash in the lautering vessel is not possible. because the temperatures in

the mashing process do not exceed those in the lautering vessel.
Further advantages of the ring-shaped lautering vessel observed in integrated brewing vessels include the almost uniform speed of the knives as they rake the bed and also rapid lautering, which yields very clear worts, as well as swift spent grain removal.

MashTuns and Wort Collection Vessels

The integrated brewhouse concept was applied to the combination mash tun and wort collection vessels.
The wort collection vessels have a circular, concentric cross-section. The inner walls of the wort collection vessels also compose part of the walls forming the circumference of the heated mash tun. in a coaxial arrangement. Through energy conservation and compact construction, this combination vessel design has proven its merit.

Heating and Boiling the Lauter Wort

Assuming a 60 minute boil per batch, with 21 batches per day, the conditions exist for a direct exchange of heat to occur between the air-free steam rising from the boiling wort and the lauter wort of the next batch, which can be heated to a temperature just below boiling.
This can be done without the use of an intermediate medium for storing the heat, such as hot water. A total evaporation of 5.5 percent is desired, with the amount of evaporation directly correlated with the planned temperature increase in the lauter wort. in this case from 72°C to 97°C.
As can be seen in the diagram (see fig. 2), the following cycle occurs during the healing and boiling processes: During the 60 minute period of time that a batch of wort is boiling in kettle 1, the entire volume of lauter wort is pumped in parallel from wort collection vessel 2 through the shell and spiral lube heat exchanger into wort kettle 2. Likewise, while the wort is boiling in kettle 2, the lauter wort from collection vessel 3 is pumped into kettle 3, and then while the wort in kettle 3 is boiling, the wort in collection vessel 1 is pumped to kettle 1.

The boiling and heating processes are carried out in a consecutive fashion, and therefore, in this manner, the next batch of lauter wort is heated while the wort is boiled. After every boiling cycle, the hot trub is separated by means of whirlpooling, after which the wort is cooled.

Energy savings are primarily dependent on the amount of total evaporation. Compared to a conventional process with 12 percent total evaporation, a primary energy savings of 67 percent can be expected based on the alternative process: a designated total evaporation of 5.5 percent and an increase in the temperature of the lauter wort from 72 to 97°C is performed with heat transfer from the boiling process. Therefore, the total energy requirement for boiling the wort, including heating the wort from approximately 97 °C to boiling, can be reduced to 7.1 kg of steam per hi of cast-out wort. Conventional methods

with 12 percent total evaporation, by comparison, require 21.3kg of steam per hl of cast-out wort. Additionally, the steam arising from boiling the wort is cooled from approximately 98°C down to 30°C using water; thereby heating the water from 12 °C to approximately 80°C. The amount of hot water created in this process amounts to 0.06 hl per hl of cast-out wort.

• Summary

Through increasing the number of batches produced daily to 21, the dimensions of brewhouse vessels can be reduced by approximately 2/3. Likewise, the amount of energy required per hour from the boiler room is also reduced by this extent. For this reason, smaller boilers are able to provide sufficient amounts of steam and, therefore. may be utilized.

Furthermore, characteristic energy peaks are reduced, also lessening the environmental impact. The multi-vessel brew- house requires very little space due to the smaller size and compact design. An additional advantage of a brewing system of this kind is that a 100 hl brewhouse can produce 2100 hI of cast-out wort every day.

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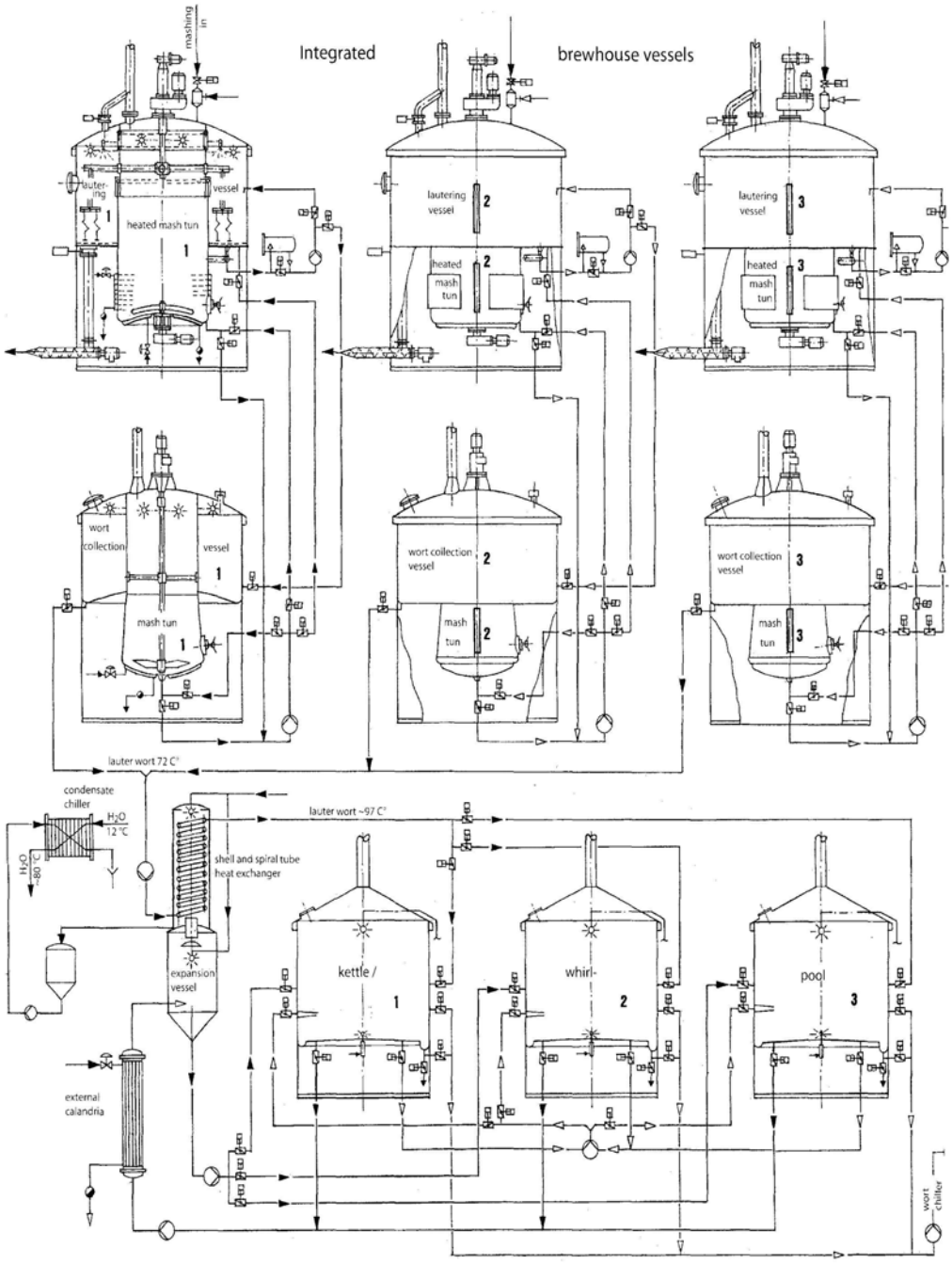

Fig. 1 Compact brewhouse with simultaneous lauter wort heating and wort boiling brewhouse vessels

Source: Sudhaustechnik Woi

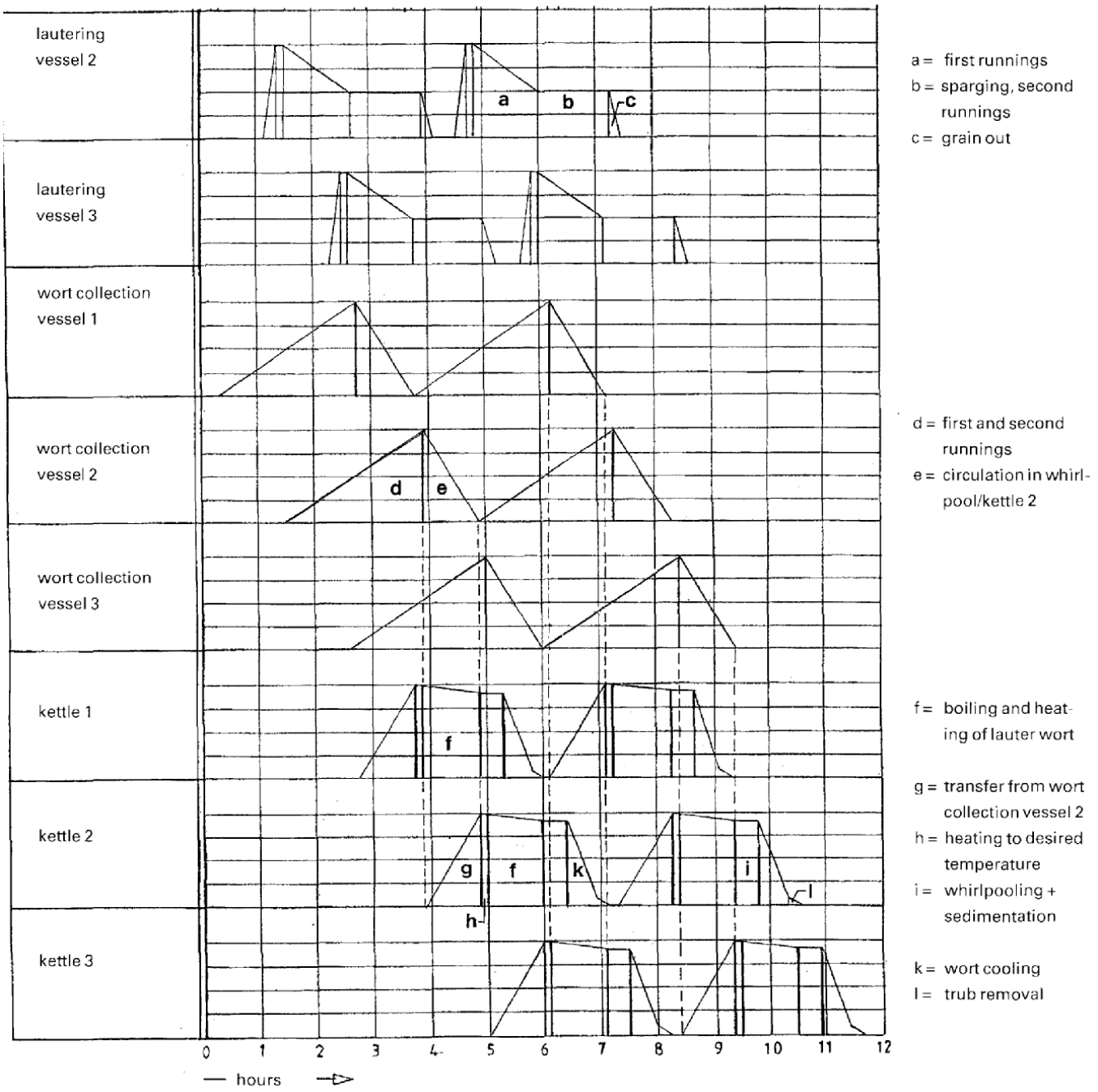

Fig. 2 21 batches per day brewing cycle

Source: Sudhaustechnik Woltseder