MEURABREW

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MEURA'S CONTINUOUS BREWHOUSE

In the last two decades, major advances in performance have been achieved in batch brewhouses mainly by introducing fine milling technology. For example, the productivity of brewhouses increased from 8-10 brews/day to 14 brews/day, and even more when equipped with a Meura2001 mash filter.

Despite these important improvements to the batch brewhouses, breweries keep asking for further productivity increases together with a reduction of utilities consumption and waste disposal. The likelihood of further improvements using the current method of batch brewing is limited. **Only a conceptual change can respond to the current and future demands of the brewing industry.**

These inquiries made Meura rethink the brewhouse technology and ended in a continuous brewhouse concept, called the "Meurabrew".

THE MAIN REASONS TO DEVELOP THE CONTINUOUS BREWHOUSE ARE:

- **Pressure on the commodity costs:** The increase in oil and other commodity prices is putting pressure on the industry to reduce the consumption of utilities. Further, the costs of raw materials have also increased.

- **Sustainability:** The extended consumption of utilities during the wort production leads to a large CO_2 footprint. A sustainable industry needs to implement the most efficient technologies. Beer processing also consumes a significant amount of drinking water, which is becoming scarce in more and more areas. The pressure from society to reduce wastewater is increasing.

- **Downstream product differentiation:** In the last decade, high gravity - and even "very high gravity" - brewing has become an industry standard within the large lager breweries. One of the consequences is that product differentiation is done downstream in the production process at the beer filtration step.

The Meurabrew is a continuous brewhouse with many advantages compared to the traditional batch brewhouse. The Meurabrew is an integrated combination of Meura's proven technologies adapted to a continuous operation. It consists of the **Classicmill** for the milling step and the **Mechamasher** with the **Aflosjet** for the mashing-in and mashing step. The wort filtration is performed by **Meura2001 mash filters.** The boiling is provided by the combination of the **Clarisaver** and the **Ecostripper.**

TECHNICAL DESCRIPTION

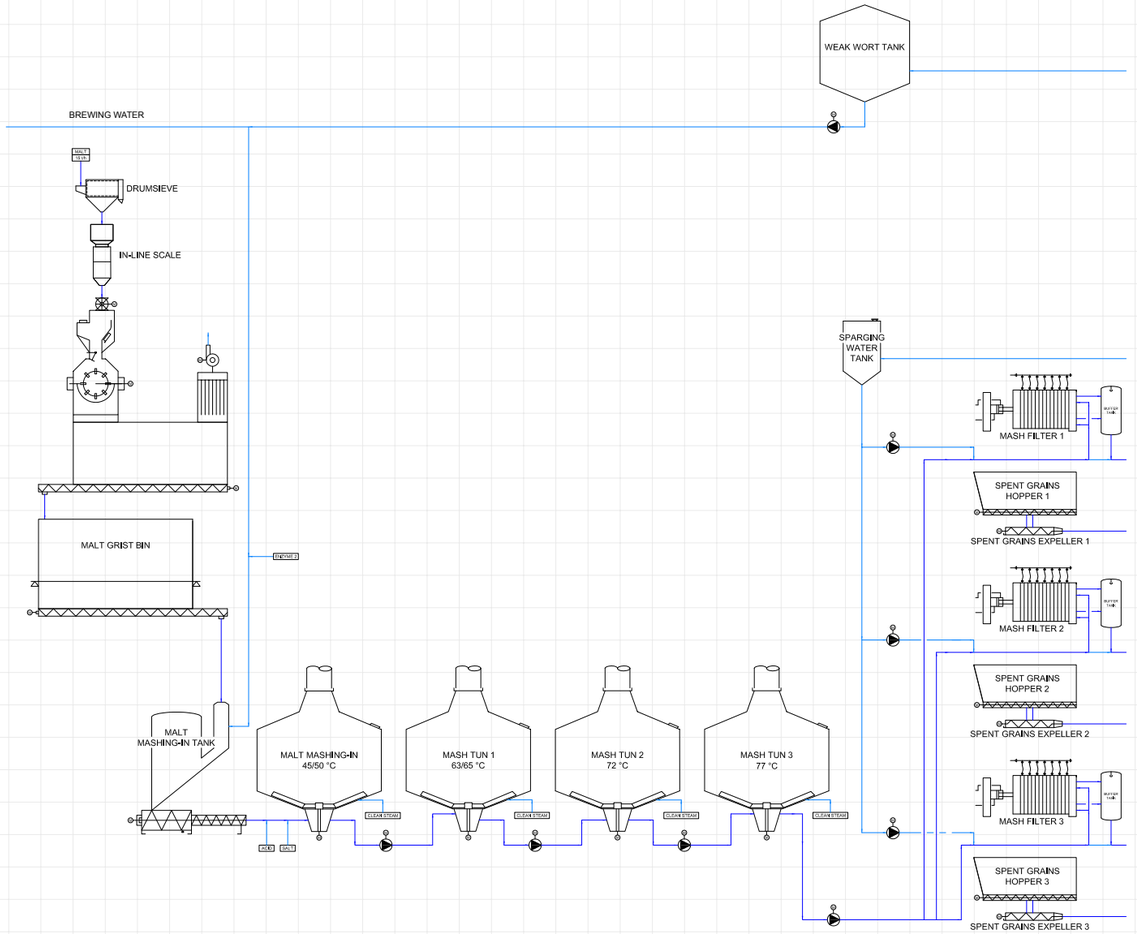

Figure 1 shows the first part of the Meurabrew from milling to mash filtration using the following technologies:

- **Milling**: Meura's Classicmill or Carbomill works perfectly in a continuous regime.

- **Mashing-in and mashing:** The Mechamasher assures a continuous lump-free mash that is pumped to the mash group. Different mash vessels keep the mash at a constant temperature with a specific holding time. A continuous flow passes through these vessels and provides the brew diagram. Thanks to the Aflosjet system, Meura's patented direct steam heating system, these vessels do not need to be cleaned during the production process. A fouling-free mash heating cycle is required for the continuous process. Classical double jackets are thus not an option.

- **Mash Filtration:** Wort filtration is performed with Meura2001 mash filters equipped with Meuraclean. Three parallel filters provide a regular continuous filtration process. Consequently all the renowned advantages of the Meura2001, such as for example the yield, wort quality and density, are retained with the Meurabrew.

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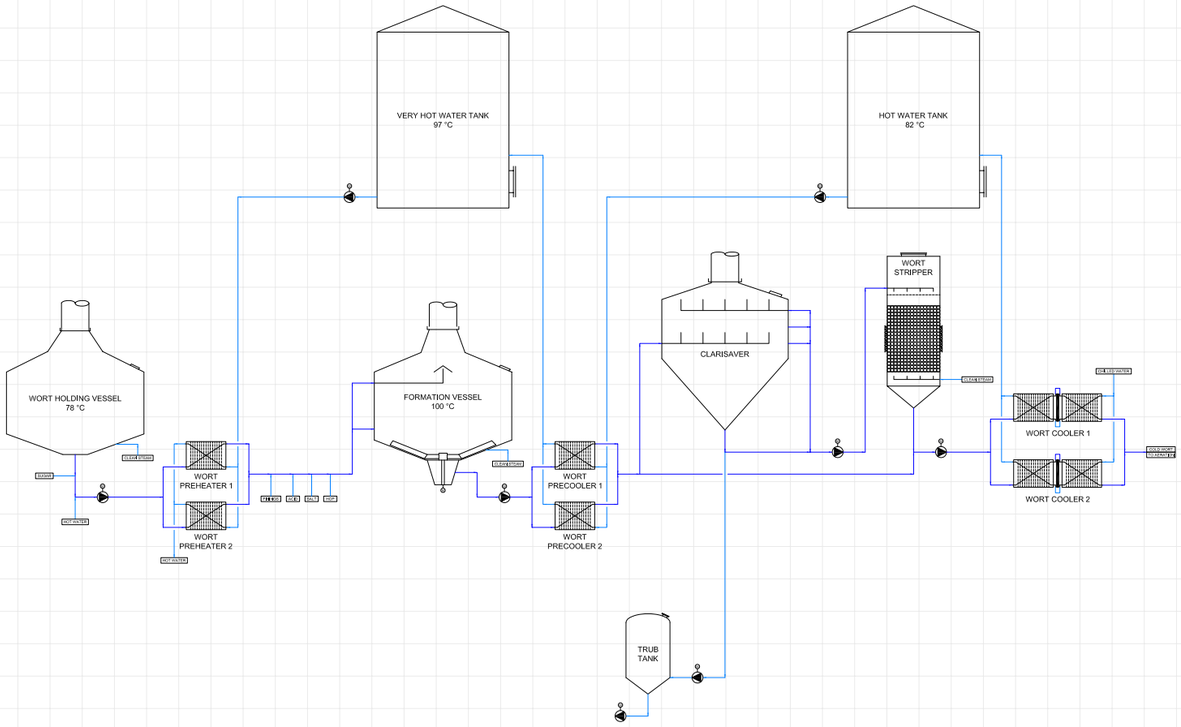

Figure 2 shows the continuous wort boiling, hot trub recovery and wort cooling of the Meurabrew using the following technologies:

- **Wort boiling and trub recovery:** after mash filtration the wort temperature is about 78°C and should in a first step heated up to its boiling temperature. A wort/wort heat exchanger allows the energy transfer from wort cooling to wort pre-heating. An addition in-line steam injector is allowing that the wort enters the formation vessel at boiling temperature. Added hop is also homogenized. An adapted agitator ensures sufficient mixing for the trub formation. In the next step the wort is clarified by a continuous Clarisaver. Clarification is necessarily done prior to stripping in order to avoid fouling the column with hot trub.

From the clarification unit, the wort is then stripped by the Ecostripper, which is a single pass stripping column. The unwanted volatiles are stripped by a counter flow of live clean steam. From the bottom of the stripping column, the stripped wort is continuously pumped through.

- **Wort cooling:** Two wort coolers in parallel ensure continuous cooling of the wort.

MAIN ASSETS

In general, continuous processes are more energy efficient, easier to control and consequently lead to a lower production cost. The Meurabrew combines exceptional performance in a number of areas:

1. EXTRACT YIELD

- Reduced extract losses. With the continuous brewhouse solution, there are no losses due to the transfer of batches, which is responsible for extract losses since vessels are never completely empty. Furthermore the extract yield is also higher thanks to the trub recycling, the fine milling and the Meura2001 technology.

2.UTILITIES

- Reduced peak consumption. The most important utilities consumed in the brewhouse are steam and cooling liquid for the wort cooling step. In a batch brewhouse, different batches are processed at the same time and the wort cooling normally takes place within 50-60 minutes. It leads to large peak consumptions during these steps. With the continuous brewhouse these peaks in consumption are negligible.

- Reduced consumption of utilities. Thanks to the continuous process, the consumption of water, steam and electricity is reduced.

- Reduction of water consumption due to the absence of drainage during production

- Reduction of steam consumption because of live clean steam injection directly into the mash tuns
- Reduction of electricity consumption thanks to the negligible peak consumption

- Reduced energy losses. As there are no more batches pumped from vessel to vessel with the continuous solution, air no longer enters the vessel so the vessel no longer cools down. Furthermore, as all pipes and vessels stay continuously filled with mash or wort, the heat losses experienced in a batch brewhouse are avoided.

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3. SPACE REQUIREMENT

- Limited space requirements. The most state-of-the-art batch brewhouses make only about 14 batches a day. About every 100 minutes one batch is produced, which consequently requires vessels that can accommodate the required volumes. Large brewhouse vessels also mean large piping diameters, large valves and pumps with high flow capacities. A continuous flow significantly reduces the plant dimensions.

4. BEER QUALITY

- Reduced oxidation of mash and wort. With the continuous process all vessels remain filled up. The oxidation due to the transfers as in batch brewhouse is thus avoided. The only contact between air and product takes place on the liquid surface. As the volume of the vessels in the continuous process is smaller, the contact surface is also limited, what leads to a lower oxidation.

- Easy process control and improved regularity in the products parameters. In practice, it is difficult to have the same process conditions between similar batches. The fouling of the mash tun(s) and wort kettle during production changes the heating performance of these vessels and thus changes the process conditions. Consequently a significant variation in for example colour or bitterness is noted between batches of the same brands. These fluctuations can be limited with a continuous process.

5. PRODUCTIVITY

- Better productivity. There are no stops and restarts during the production in a continuous process, which is the opposite of the batch brewhouse. Moreover CIP cycle occurs only once a week for the continuous brewhouse compared to the batch brewhouse, which requires an intermediate CIP cycle for some of the equipment.

6. WASTEWATER

- Reduced waste disposal. Especially in case of high gravity brewing a significant BOD and COD is sent to the wastewater plant. During continuous production no drainage occurs, which considerably reduces the wastewater volume. Especially in case of high gravity brewing a significant BOD and COD is sent to the wastewater plant.

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