MASTER BREWERS ASSOCIATION OF THE AMERICAS

OLD-FASIONED PROCESSING INTEGRATED IN A BRAND NEW BREWHOUSE

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Introduction

A directly-heated mash and wort kettle with a bottom made of copper, a coppery coolship and baudelot cooler, turbid mashing technology – no, you're not reading in an historical description of an old brewery, last year these mentioned components were requested at Kaspar-Schulz, Bamberg in the course of a brewery project in Oxford, Connecticut.

Direct-heated mash and wort kettle

To realize a efficient and hygienic process, several points have to be regarded. To connect the copper floor to the stainless steel frame in a hygienic way, the connection should be welded. After the welding process, the weld has to be planed and polished.
In former times these connection was realized by rivets accompanied by problems concerning tightness and biological cleanness.

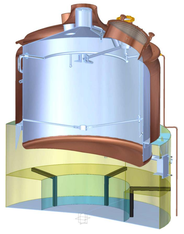


Fig 1: Schematic illustration kettle

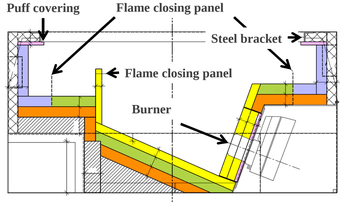


Fig 2: Schematic illustration combustion chamber

To avoid too extreme temperatures on the copper floor, the flame of the burner has to be led. Therefore several panels and channels made of specific stone or wools are destined. Figure 2 is showing the several fixtures which guarantee at least an uniformly distributed temperature under the copper.

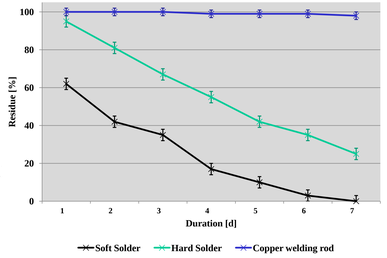
Due to the high temperature on the copper the wort gets a typically caramel flavour during the process. To avoid a scorch of the caramel, the stirrer is equipped with a polish chain. This copper chain is rubbing on the floor during the boiling process. The copper floor and chain is shown on figure 3.

Fig 3: Kettle with copper floor and chain

Welding copper

Cleaning and disinfection of components made of copper always has been a big problem. Especially solder connections had not to get in contact with concentrated acid or caustic. Due to advanced material development several copper welding rods are available on the market at the moment. Chart 1 is showing the result of one of our test we made concerning acid and caustic resistance. A defined amount of solder and welding rod was prepared with concentrated acid.

Chart 1: Acid resistance of solder and welding rod



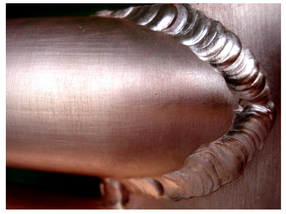


Fig 4: Welding tests

After numerous test trials a welding rod could be determined which is able to resist common cleaning and disinfection procedures. Besides the material also the welding process and parameters had to be adjusted. Figure 4 is showing a test object to find adjustments such as voltage, feed motion or inert gas concentration.

Coolship

The coolship was designed of three copper plates which were edged. After forming the shape the parts were welded together.
To compensate the motion of material caused by the different thermal expansion, the ship itself is hanging free in a stainless steel frame. To ensure the stability of the bin, the material is edged slightly in different layers.

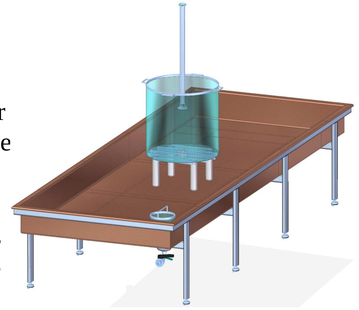


Fig 5: Schematic illustration coolship

On top of the coolship you can find a sieving basket for the removal of hop residue shown on figure 5 and 6. Additionally there's a sieve above the drain to the cooler to retain hot trub.
The dimension of the bin is referring to a maximum wort filling level of 10''(25cm). During the engineering the main focus was based on hygienic design for example the avoidance of any contact of rivet or screw connections to wort.

Fig 6: Working coolship

Baudelot cooler

For the second cooling step a baudelot cooler, shown on figure 7 was installed in the brewhouse. It consists of horizontal copper pipes and a wort distributing and collecting pan. Besides a large cooling surface the design guarantees an optimum aeration of the wort. The number and length of the pipes is depending on the favored cooling temperatures and the amount of cast wort. Due to the use of hard or soft solder for the connection of the copper pipes it was very difficult to keep antique baudelot coolers clean. By the use of copper welding connections this problem is eliminated. Caustic and acid can be used under certain conditions. To get a defined wort film on the copper pipes, the wort distributing pan is perforated with small holes. Additionally there's a perforated feeding pipe across the hole pan.

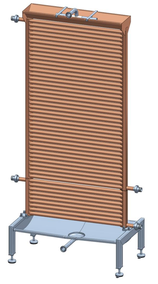


Fig 7 Schematic illustration baudelot cooler

Fig 8: Baudelot cooler aerating wort

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