STEINECKER yeast management
For high productivity and product quality in the brewery
Optimum yeast management is the basis for optimum beer quality

Numerous production steps in the brewing process are affected by the yeast management or, in turn, affect it. A steadily high beer quality and a high brewery productivity greatly depend on the optimum handling of yeast.

The STEINECKER yeast management provides the brewer with a comprehensive process from the pure yeast culture in the laboratory to the disposal of excessive yeast or spent yeast.

At a glance

− Yeast propagation systems for the production of highly vital yeast strains
− Continuous or batch operations in a one-tank process
− Two- or three-tank processes are also possible if required by the customer
− Use of a fully automatic process with a high hygiene standard
Task of yeast management

**Propagation**
- Provision of biologically safe and vital culture yeast
- Pure yeast culture in the laboratory all the way up to the Carlsberg bottle
- Propagation from the Carlsberg bottle to the pitching quantity

**Storage**
- Yeast cropping, storage and yeast addition
- Vitalisation of crop yeast

**Treatment**
- Beer recovery from yeast
- Yeast drying

**Disposal**
- Economic disposal of excessive yeast and waste yeast

**Stages of propagation**
- Lag phase: Activation of the metabolism at low multiplication but fast intake of oxygen
- Log phase: High metabolism and fast intake of oxygen at maximum and constant growth rate
- Stationary phase: Beginning of fermentation and end of the growth rate
- Decreasing phase: Higher cell death rate than cell renewal rate
From the laboratory to production

Pure yeast culture in the laboratory
- Cultivation is done step by step.
- At the end of the respective log phase, dilution is performed with wort until the initial concentration has been reached again.

Handover to production
- Cultivation in the laboratory is done within propagation on a larger scale.
- In the one-tank process, dilution with wort is performed in one tank. Separate cooling zones enable temperature regulation for different filling degrees.
- As an alternative, two- or three-tank processes may be employed.

<table>
<thead>
<tr>
<th>Description</th>
<th>Temperature</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agar, slanted culture</td>
<td>20 °C</td>
<td>1 day</td>
</tr>
<tr>
<td>150 ml of wort</td>
<td>20 °C</td>
<td>1.5 days</td>
</tr>
<tr>
<td>1 l of wort</td>
<td>20 °C</td>
<td>1.5 days</td>
</tr>
<tr>
<td>5 l of wort</td>
<td>14 - 15 °C</td>
<td>1.5 days</td>
</tr>
<tr>
<td>Carlsberg bottle</td>
<td>12 - 15 °C</td>
<td>3 days</td>
</tr>
</tbody>
</table>

Carlsberg bottle → 1. wort and yeast mixing → 2. wort and yeast mixing → Fermenter
From the laboratory to production

Handover to production

- If a continuous wort production in the brewhouse cannot be ensured, we recommend buffering wort in a steriliser.
- However, with repeated sterilization it is important to pay attention to the microbiological safety (residence time of cold wort <8h) and the possible loss of nutrients necessary for yeast growth.
- Sterilisation can be performed with a heating jacket, an external heat exchanger or a flash pasteuriser. Cooling is achieved by circulation when the tank cooling system is activated.
- Agitators or external mixing and aeration devices are employed for homogenising and aerating the yeast.
- Agitators are less suitable for processes with wort and yeast mixing technique.
- At optimal installation position for an efficient mixing effect of the full tank, the volumes before second filling cannot be agitated.
High-capacity yeast propagation for a high beer quality

**Design of the tank size**
- The desired starting concentration is e.g. 12 million cells/ml
- At the end of the log phase, approx. 120 million cells/ml will be achieved.
- For the next starting concentration, a dilution with factor 10 is required.*

**Use of a start fermenter**
- In order to reduce wort loss or to keep the propagator size small, a start fermenter can be used.
- The start fermenter has approx. 33% of the volume of a normal fermenter, because three times the starting quantity of yeast is used during fermentation.

*Exact calculation based on individual starting and end concentrations*
Yeast propagation – our standard solution

STEINECKER concept – one-tank process

- Cold filling without steriliser
  - The sterile wort is taken from the brewing process at the wort cooler
  - An additional sterilisation is not required with a correct cleaning process of the product lines and the propagator
- External mixing and aeration device
  - Even treatment and aeration of the entire tank content
  - No inner components required in the propagator for an agitator bearing – hygienic design.

Sterile air (Sterile air pipe can be sterilised separately)
Yeast propagation – the process variants

One-tank process in batch operation
- The propagator is filled in three steps from 4 to 160 hl.
- New extract is provided with each filling and the yeast suspension is diluted again.
- The propagation is thus permanently maintained in the log phase.

One-tank process in continuous operation
- The propagator is not fully emptied, a yeast depot will remain.
- The propagator will be filled again in two steps to 160 hl.
- The propagation can be maintained up to the next new batch (4 - 6 treatments).
Yeast storage – how can the high yeast quality be maintained?

Vitalisation of crop yeast
- The crop yeast is degraded by the pressure in the fermenting tank and the CO$_2$ content.
- CO$_2$ is forced out via the aeration device and the yeast vitalised.

Activation of the prepared yeast
- Before pitching it, the yeast can be activated by systematic aeration.
- This will increase the metabolism, the yeast will become more vital, and fermentation is quicker.
Yeast storage – the tank concept

**Design of the tank size**

− Three times as much yeast will be generated during fermentation than required for starting.
− Crop yeast (thick yeast) has approx. 1,200 million cells/ml
− With a planned starting number of cells of 12 million cells/ml, the required quantity corresponds to 1% of the fermentation tank volume.

During production, the yeast amount is multiplied.
Vitalisation of the yeast by an external aerating device

- Less shear stress than with an agitator
- Even treatment and aeration of the entire tank content
- Vitalisation and activation of the stored yeast
- Variation of flow and air volume enable flexible aeration intensity
- Installation without inner components in the storage tank according to the specifications of Hygienic Design
Benefits at a glance

Guaranteed beer quality
The STEINECKER yeast management ensures a consistently vital yeast in the brewing process and thereby ensures the constantly high beer quality at maximum productivity.

Simple line concept
The simple line concept ensures a reliable operation of the propagation system.

High process reliability
The flexible monitoring of the vitalisation and activation of the yeast with an external yeast aeration system supports a high-performance fermenting process.

Fully automatic processes
The system is designed for fully automatic operation and integrates all cleaning and sterilisation steps.
We do more.

Digitalisation
Process technology
Bottling and packaging equipment
Intralogistics
Lifecycle Service