

STEINECKER ShakesBeer

Mashing technology at top level





Improved extract yield with reduced mashing times

Maximum flexibility, best quality and efficiency are required in each individual step of the brewing process. The ShakesBeer mashing system uses new techniques for improving the technological mashing parameters. Structured pillow plates as heating surfaces and integrated vibration units improve the brewing process.

At a glance

- Improved heat output due to a turbulent flow pattern of the mash at the heating surface
- Vibration units for intensive and homogeneous mixing of the mash and an efficient extraction of all soluble components of the malt
- Reduced increase of ageing components in the beer by reduction of the dissolved oxygen in the mash
- Application especially for high-gravity processes with an increased concentration of mash





Which tasks are to be fulfilled by the mashing process?

The mashing process is a complex combination of chemical and physical processes. The individual requirements:

High heating rates

- Gentle and fast energy transfer from the heating medium into the mash
- Homogeneous heat distribution
- Less fouling on the heating surfaces

Mixing and dissolving

- Intensive and homogeneous mixing of the mash to extract the soluble components of the raw material
- Prevention of lumps and oxygen absorption

Catalytic reaction

- Starch degradation as complete as possible
- Defined protein degradation
- Degradation of hemi-cellulose and gums





Design features

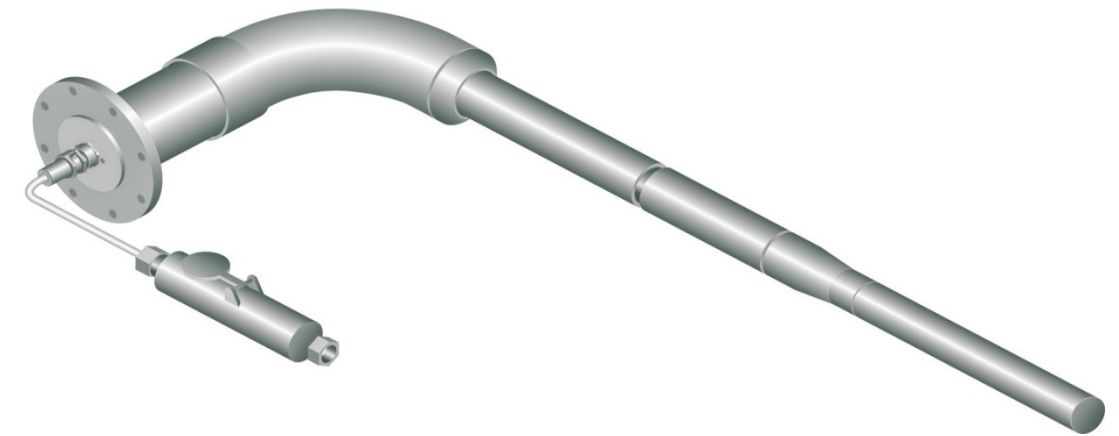
Pillow plates

- Micro-turbulent flow of the mash thanks to its guidance along the interior corrugated heating surface of the mash vessel
- Even heat absorption in the mash without overheating the outer layer
- Reduced fouling and improvement of the mash quality due to low steam pressures of 1 – 2 bar



Vibration units

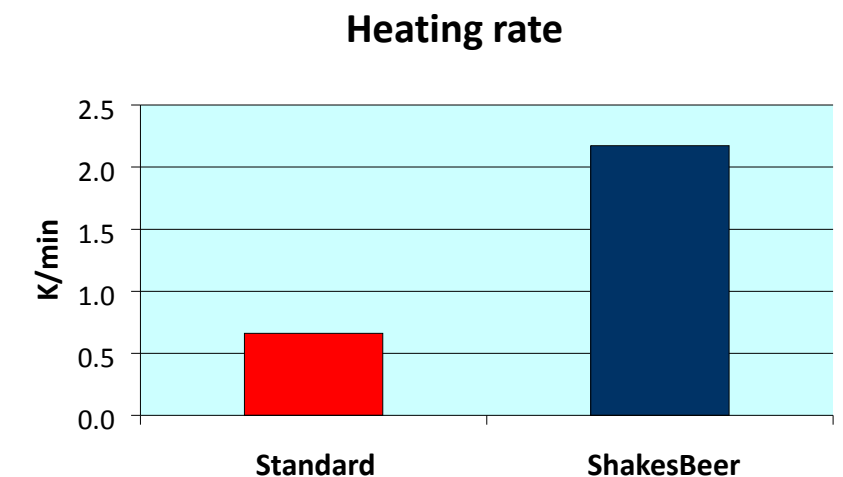
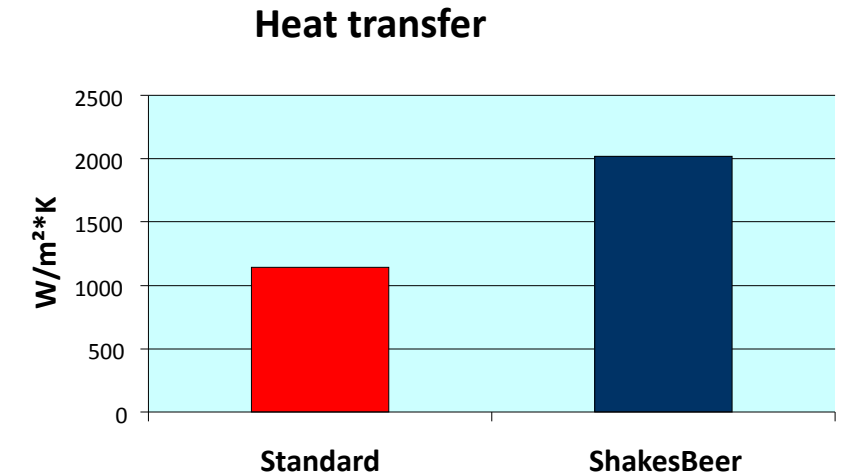
- Vibration units that can be integrated in the vessel as an option and can be activated and deactivated as required to optimise the mashing process
- Vibrations within a defined frequency range to generate a resonance vibration in the mash
- Resonance for intensifying physiochemical degradation processes and the expulsion of gas inclusions from grist particles





Technology for efficient mashing: Pillow plates

- In an existing mash tun, the smooth heating surfaces were replaced by the structured pillow plates.
- The size of the heating surface has not been changed.
- Caused by the changed flow pattern of the mash on the heating surface, the heat transfer of 1,100 W/m²*K before the modification was increased to be more than 2,000 W/m²*K after the modification.
- This resulted in an increase of heating rate from about 0.7 K/min to 2.2 K/min at the same temperature of the heating medium.
- With the recommended heating rates of 1.0 K/min for malting and 1.5 K/min for adjunct mashing, smaller surfaces are required than for the conventional configuration.

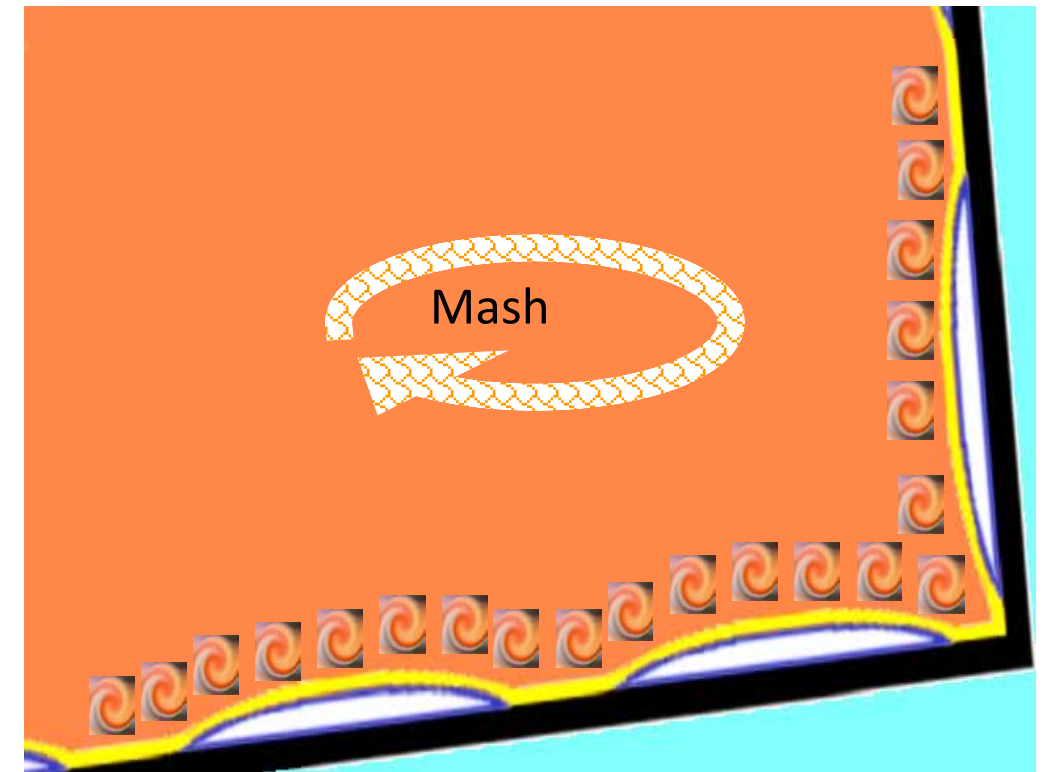




Technology for efficient mashing: Pillow plates

Which are the benefits of structured heating surfaces?

- A turbulent mash flow pattern on the heating surface improves the heat transfer and thus the heating rate.
- With the same surface and heating rate, the heating medium temperature can be reduced, which reduces fouling and a continuous heating process can be ensured for a whole production week.
- A smaller surface is required for the same heating rate and heating medium temperature, and thereby the vessel can be designed with a smaller diameter, depending on the specification.
- Higher heating rates can be achieved with the same surface and heating medium temperature.





Technology for efficient mashing: Vibration units

- The vibration generator is an electric unbalance motor surrounded by a stainless steel cylinder.
- The vibration frequency is modulated by a converter within the range of 70 – 110 Hz.
- An oscillation decoupling device prevents transfer of the vibrations to the mash vessel.
- The vibration source is connected to the PLC of the mash tun and can be activated or deactivated as required.
- The vibration units are available in lengths of 1,200 and 1,600 mm, special designs can be produced, if required.

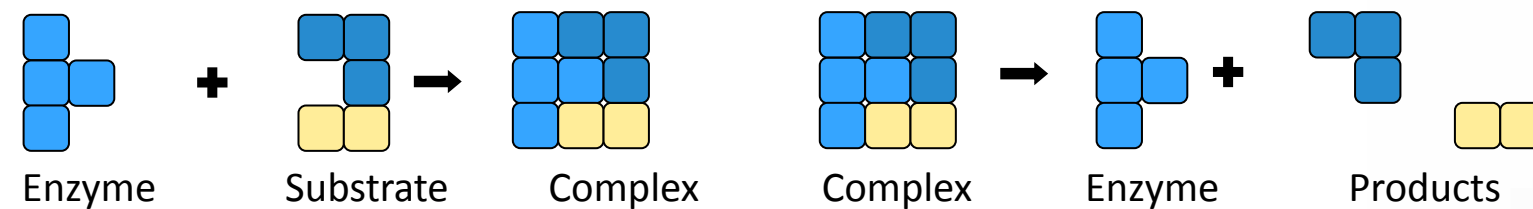




Technology for efficient mashing: Vibration units

How do the vibration units affect the enzymatic reactions?

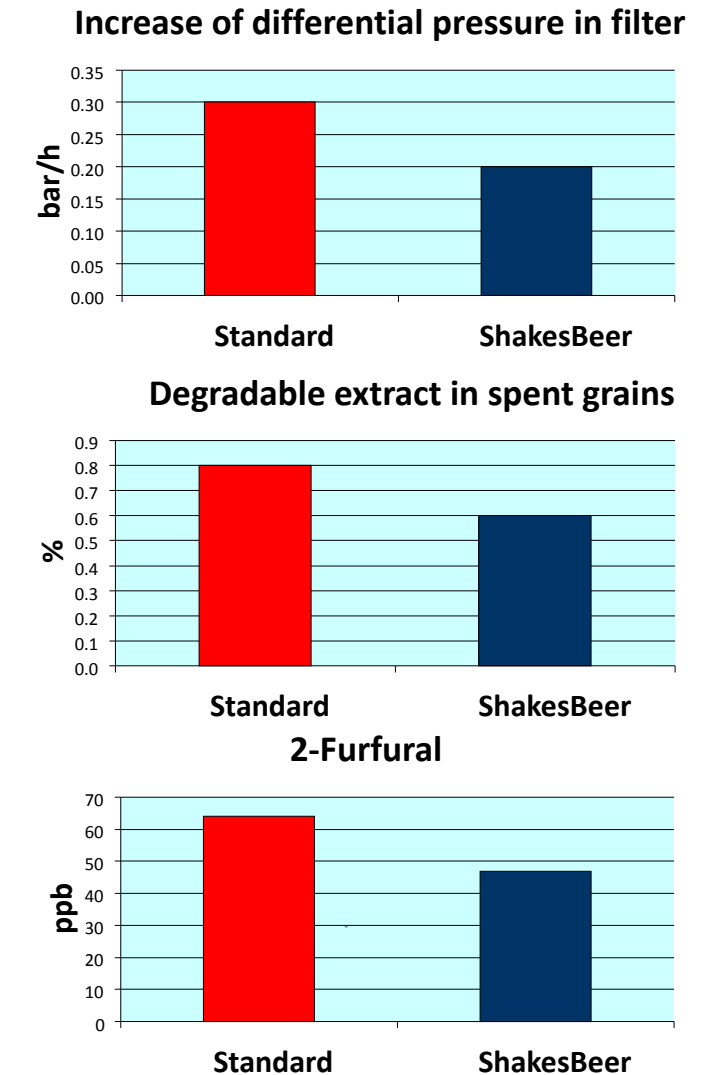
- Enzymes operate on the basis of the "Key-lock principle", i.e. they often catalyse only one substrate and one reaction.
- Prerequisite for the catalysis is that the enzyme and the substrate hit each other.
- The more the mash moves the higher is the probability for an enzymatic catalysis.
- The activation of vibration units in a defined frequency range will excite resonance vibrations within the mash.
- The increased movement within the mash intensifies the enzymatic reactions.





Which are the analytical results when using ShakesBeer?

- Enzymatic reactions:
The increase of the enzymatic efficiency results in an improved filterability of the beers.
- Soluble malt components:
The more intensive solution processes can be recognized by the lower percentage of degradable extract in the spent grains.
- Soluble oxygen:
If the oxygen content is reduced during the mashing process, the increase of ageing components in the beer will be reduced as well.





Your benefits in figures

Return on investment (ROI)

The increase in yield and the improved filterability allow for shorter investment amortisation times.

	Conventional	ShakesBeer
Brews/a	2,500	2,500
OBY/%	98	98.3
Grist per brew/kg	10,000	9,977
Malt per year/t	25,000	24,942
Costs of malt per t/€	400	400
Number of filtrations/a	175	150
Cost of filtration/€*	900	900
Saving/a		€51,500

* Costs may vary considerably, incl. CIP and personnel costs.

Peak loads

Through the reduction of fouling on the heating surface, it is possible to work at almost a constant heating medium temperature between cleaning processes. The pressure of the heating medium does not need to be increased.

	Conventional	ShakesBeer
Heating surface/m ²	10	7
Heating rate _{clean} °K/min	1	1
k value _{clean} W/m ² *K	1,400	2,000
k value _{dirty} W/m ² *K	1,100	1,900
Heating rate _{dirty} °K/min	0.78	0.95



Your benefits in figures

Productivity

Reducing the rest duration using vibration and faster heating processes will increase productivity in the case of a supply shortfall during mashing.

	Conventional	ShakesBeer
Brews per day _{plan}	10	10
Action time per brew/min	144	144
∑ rest duration/min	80	70
∑ heating duration/min	20	15
Saving per brew/min		15
Saving per day/min		150
Extra brews/day		1

Quality

The beer quality, and above all the taste stability, can be improved with the ShakesBeer mashing system.

	Conventional	ShakesBeer
NIBEM foam index	266	289
3-Methylbutanol [ppb]	5.9	2.5
2-Furfural/ppb	64.7	47.1
Phenylethanol/ppb	4.8	2.3
γ-Nonalacton/ppb	15.0	9.7



Benefits to you

Even heating process

The microturbulent flow of the mash is based on the flow guidance along the interior corrugated heating surface – the pillow plates. This reduces the fouling effect. An even heating process during the complete production week is achieved.

Use of smaller vessels

The improved heat transfer allows smaller mash vessel dimensions with the same heating rate and heating medium temperature.

Improved energy efficiency

An increased heating rate can be realised with the same heating medium temperature.

Benefits from using the optional vibration units

Improved wort lauterability

Thanks to the vibration units, the brewer will benefit during the lautering process: The total lautering time can be reduced by at least one deep cut less.

Improved beer filterability

Optimised beer filtration thanks to a reduced consumption of kieselguhr and an increased filter service life.

Reduced oxygen content

The lower oxygen intake of the mash during mashing in reduces premature oxidation processes.

Can be retrofitted

Nearly each mash vessel can be retrofitted with vibration units within one day.



Everything from a single source

KIC KRONES cleaning agents make your machine shine

Only if the production environment is immaculate, can your product be brilliant. KIC KRONES provides you with the optimum cleaning agents and disinfectants for each individual production step.

Lubricants from KIC KRONES for every production step

Whether for gears, chains or central lubrication systems – our greases and oils are true all-round talents. They can reach every lubrication point, protect your line and ensure gentle treatment for your products thanks to their food-grade quality.

EVOGUARD – excellent valve technology all along the line

The valve series of EVOGUARD comprises a modular system with hygienic and aseptic components which contributes to every point of the production line with increased performance and which has the perfect solution for every process step.

EVOGUARD – pumps for absolute process safety

In addition to the separation and locking of a line, one thing is particularly important - and that is the reliable conveyance of your product. This is why EVOGUARD also offers innovative centrifugal pumps in addition to high-quality valves.



Digitalisation



Process
technology



Bottling and
packaging equipment



Intralogistics



Lifecycle
service

We do more.

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