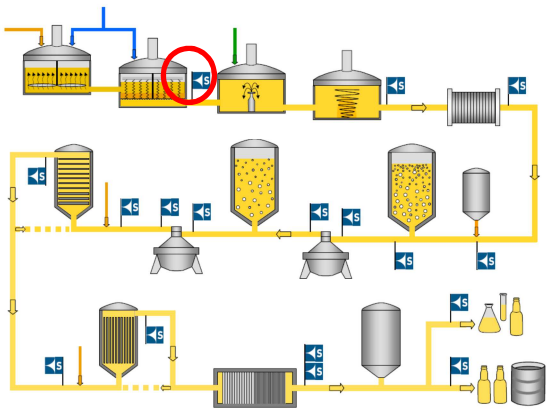
Application Report
Turbidity after Lauter Tun

SIGRIST PROCESS-PHOTOMETER

As a result of their large measuring ranges, the new generation of SIGRIST's turbidity monitors form a product family which can be used for a large number of applications within breweries.
In the following, the measurement of turbidity in the brew house and especially at the outlet of the lauter tun shall be addressed.

Benefits

In recent years, the following situation has developed within global commodity markets: The demand for malting barley has grown as a result of the increased beer production worldwide. However, problematic weather conditions (dry periods in spring) and the demand for renewable raw materials for energy generation has resulted in smaller harvests with poorer qualities in recent years.
This results in higher demands on the brewing process. Turbidity measurement in the brew house has become more important since information on the later filterability and on the stability of the beer (shelf life) can already be obtained at this early stage. With the aid of turbidity measurement, work in the brew house can be optimised to the properties of the raw materials. Thus, problems with raw materials can be compensated more effectively.



Picture 1: Process diagram of beer production.
The red circle marks the point of measurement at the outlet of the lauter tun.

Typical application

Work in the brew house – which consists of mashing, lautering to separate solids from liquid, and wort boiling – represent the core of each brewing process. Turbidity measurement is installed at the outlet of the lauter tun and measures turbidities in the middle to higher ranges.
As regards to the lauter process:
After the mashing is concluded, the mash (a mixture of husks and sugar solution) is pumped from the mash tub into the lauter tun. This has a bottom of chamfered sheets through which the liquid phase can leave the lauter tun. The husks here form a kind of filter. Since this layer (spent grains cake) grows increasingly dense after some time, it is loosened by a slowly rotating raking device.

Picture 2: Lauter tun with raking device

Turbidity measurement has two functions. At the beginning, the best starting point of the lauter process has to be found. Since the filter layer is formed only gradually by the husks settling, the turbidity is high at the beginning of the lauter process. Thus, the wort is pumped in cycle (so-called turbid wort pumping) at the beginning of the lauter process until the turbidity has reached a sufficiently low initial value (approx. < 50 EBC). Then the actual lautering starts. Here, the second measurement is carried out which ensures that the turbidity is below 30 EBC during 80% of the lautering time. Higher turbidities result in an increased input of potentially unwanted substances with correspondingly disadvantageous effects on further processing (in particular filterability) and the stability of the beer.

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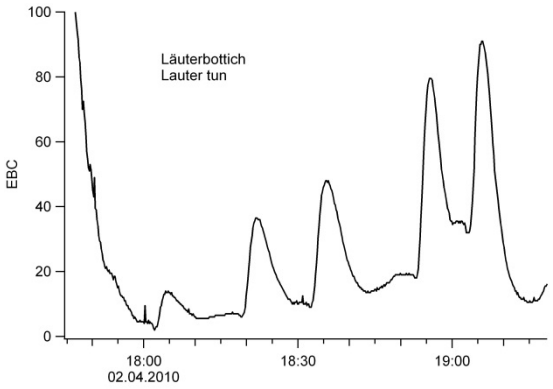
Practical measurement (example):



The diagram shows the typical course of a lauter process. The drop in turbidity at the beginning is the turbid wort pumping. It is followed by low turbidity during the lauter process. The peaks are the cuts of the raking device for loosening the filter cake.

Which savings can be effected?

The saving potentials of this application cannot be directly calculated. The benefits become most evident in connection with filtration and shelf life. Beer which had already increased turbidity values at the lautering should, for example, be blended with other beer during filtration in order not to shorten the running time of the filter unnecessarily. This saves money by an optimally long running time of the filter.

As regards shelf life, low turbidity of the finished beer has a positive effect in the forcing test. The number of possible warm days before the 2 EBC limit is reached will be higher, which means a longer chemical-physical shelf life.

Picture 3: TurBiScat with SICON

Products

Various SIGRIST products can be used:

- TurBiScat 25°: The measuring principle of this instrument corresponds to the generally valid MEBAK recommendation. It obtains the best evaluable and comparable results. The guaranteed values which brew house manufacturers refer to is the 25° forward scattered light measurement.
- SICON control unit
- TurbiGuard: can be used if only an EBC value is needed. The measurement is NOT MEBAK-compliant.
- Suitable Varivent® housing.

Parameter adjustments

- Limit formation of the mA signal in the PLC (by the customer)

Advantages of the SIGRIST TurBiScat

- EBC/MEBAK compliant turbidity measurement
- LED light source, only 8W power consumption
- Sealless design with sapphire glass
- Extremely low maintenance costs
- No purge air necessary
- Adjustment with secondary turbidity standard, no Formazin required

Advantages of the SIGRIST TurbiGuard

- Cost advantageous alternative to TurBiScat
- LED technology, only 2W power consumption
- Sealless design with sapphire glass
- Extremely low maintenance costs.

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