SOFRASER

Brewing /Quality
Phase detection

Application
Yeast detection in beer

Targets: breweries, other phase detection or decantation applications

Application

Yeast is probably the most important ingredient in beer. It is a living organism that ferments the sugar produced during brewing into a flavored brew. It creates natural carbonation in the brew through its conversion of sugar to alcohol and carbon dioxide. The fermentation process also produces a myriad of flavors associated with beer.

In the bottom-fermenting process, during primary fermentation, the wort is cooled then clarified before adding the yeast. For several days, the yeast ferments wort to beer. Toward the end of primary fermentation, yeast cells flocculate and settle at the bottom of the fermentor.
Yeast is renewable: during fermentation, the "yeast growth" is achieved by the multiplication of yeast cells. As a result, more yeast can be recovered from each brew than what was originally pitched into the brew.
To keep Lager beers' flavor and clarity intact after packaging, brewers must remove yeast and some unstable protein materials through a process called finishing. The beer is "chill-proofed" and filtered through clarification before being released for packaging into bottles, cans or kegs.

Consistency, filterability, texture, fermentation, concentration, and dry extract are common viscosity correlations used in the food and beverage industries. Consistency is the most direct correlation to viscosity as it indicates a fluid's resistance to movement. **Filterability/consistency is directly related to the viscosity of the beer** during the separation of solid malt from liquid. During this stage, a specific transition point from yeast to beer is set and inline viscosity measurement provides an easy and reliable control method for this transition point.

Challenges

During filtration processes, breweries very often face major issues related to the quality of the beer.
In fact, for each beer production, the tolerable level of yeast for proper taste and consistency should be determined in order to ensure conformity and consistency of the beer for every batch. The challenge of this process is to determine, for a wide variety of beer recipes, the optimal quantity of yeast in the beer, taking into account that yeast growth and production is unstable from batch to batch. Yeast concentration will have a major impact on viscosity which can be monitored to avoid many issues.

If the amount of yeast going to filtering and viscosity are too high:
- Filtering time is increased
- Filters clog and become difficult to clean
- Longer times are needed for the centrifuges to recycle yeast

If the level of yeast is lower than the optimal level (viscosity is too low):
- There are losses of beer
- Production costs increase

Precise separation or phase detection is achieved thanks to the detection of viscosity variations reflecting the presence of yeast in beer.

Solution

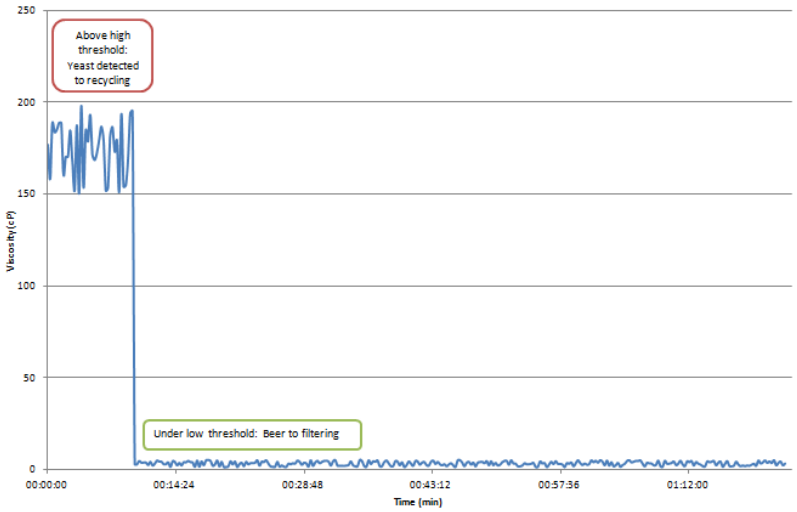
The MIVI sensor is the most sensitive consistency meter on the market. It provides a vibrating measurement detecting variation in the state of materials. The Sofraser inline MIVI viscometer, installed on the process after the beer fermentation tank, will help brewers determine the correct yeast level for each recipe. Once set, this value will be used as a threshold level and actions will be programmed to a control valve that will direct the beer above level to filtering and the yeast under the level to recycling, directly inline, with no manual intervention.

Installation

In bottom-fermentation breweries, the MIVI process viscometer is generally installed between the fermentation tank and the filtering unit. Yeast settles at the bottom of the tank where a pump is installed to pump the liquids from the tank to the sensor and the separating valve.

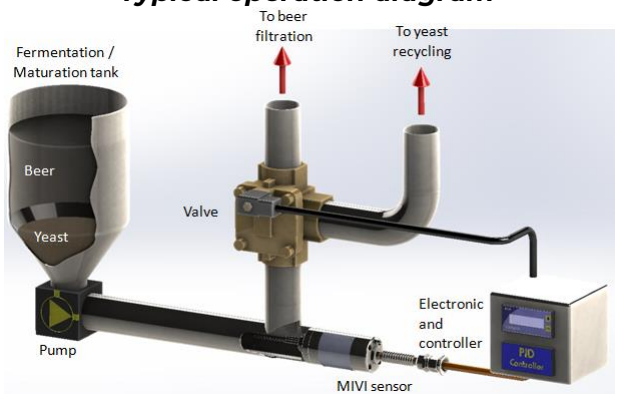
The MIVI continuously delivers viscosity information to the electronic processor. The electronic provides viscosity and correlated yeast-in-beer information to the control valve which assigns each fluid to the proper unit: beer to filtering and yeast to recycling.

Yeast in beer records at a leading American brewer



Onsite installation

Typical operation diagram



Key product characteristics:

- Repeatable and reliable
- Designed for sanitary environment (design according to 3A specifications and IP67 protection)
- Low influence of flow rate variations (measurement at high shear rate in 2nd Newtonian stage)
- Easy to install and to use
- Rugged
- No drift
- No maintenance
- High pressure capability
- Clean In Place