

Intensification of brewers's wort fermentation process with the use of rotary jet head in large capacity fermentation vessels

The world beer market is dominated by lager type – it's production is estimated at hundreds of millions of hectoliters per year. The vast majority of this type of beer is produced using CCT (cylindro–conical tank) technology. Fermentation and maturation are time–consuming processes, which are bottlenecks of beer production. Rotary jet head (RJH – originally constructed as a cleaning device, used mainly in the chemical industry) is a new solution aiming at increasing the activity of the yeast cells, and providing homogeneity in the tank, by keeping yeast cells in suspension during the process. The main objective of the study was to analyse of the impact of mixing the content of fermentation tank by the means of RJH, on the fermentation process and the quality of the final product. Experiments were carried out under full industrial operational conditions.

It was concluded that mechanical mixing shortens the time of beer production process by 10–15%: the time of fermentation and maturation by 8 to 20 h, and the cooling time by ca. 35 hours. The use of the RJH influences the synthesis and reduction of volatile compounds by increasing the concentration of esters and higher alcohols and by reducing the content of acetaldehyde. Mixing of wort during fermentation has no significant effect on the attenuation level and the ethanol content. RJH ensures homogeneity of yeast cells suspension without affecting the biomass growth. Beer produced with the use of mechanical mixing is not significantly different in flavour as compared with the standard beer produced (without mixing). It was also demonstrated that cleaning the tank with the use of rotary jet head located at the bottom of fermenter is less effective than when the cleaning head is in a standard position (top of the fermenter).