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Title:

Mid-Infrared Sensors: Testing in-progress product quality at Critical Process Control Points (CPCP) during the Brewing and Packaging Processes

Presentation Type:

Oral PowerPoint

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Abstract:

Many inline or online instruments use physical properties of fluids to determine concentrations of important ingredients. These traditional measurements include temperature, pressure, sound velocity and density. Mid-Infrared (Mid-IR) is a technique that can directly measure product properties including sugar, ethanol and CO_2 by looking at molecular absorption. Mid-Infrared technology is currently being used at Critical Process Control Points (CPCP) in the Brewing and Packaging processes. Current installations include "direct" measurement of Sugar in Wort, Ethanol in Low Alcohol Beer, Ethanol in High Gravity dilutions, Ethanol and CO_2 in Flavored Alcoholic Beverages (alcopops), phase transition as well as beer in the finishing and release-to-packaging lines. Mid-Infrared's principal advantages are temperature immunity, process line hydraulic immunity and no requirement for product flow at the point of measurement. Mid-IR is an instantaneous in-process measurement as opposed to slipstream or membrane based (inferred) measurement. Mid-Infrared directly measures fermentation parameters including fermentable sugars, ethanol and CO_2; Mid-IR does not need to convert from physical properties (such as density) to determine the concentration levels of desired measured analytes. This eliminates the need for reoccurring "product dial-in" which other measuring techniques require. The miniaturization of the VS-3000 Beer Monitor allows for a single analyzer to measure product Ethanol, CO_2 and Sugar levels using one compensation contained within the analyzer. The sensor process interface is synthetic sapphire, 316L stainless steel and virgin PEEK; the sensor is mounted directly in the CIP stream for maximum sterility & sanitization. The solid-state construction and 100,000 hour mean time to failure of the VS-3000 Mid-Infrared Beer Monitor decreases maintenance and provides the most cost effective measurement technique.

Author Biography:

Robert O'Leary is currently the Chief Technology Officer and the founder of BevSense LLC.
He is the inventor of the Mid-Infrared ATR VS-3000E Beer Monitor. Bob's background includes 20 years at PerkinElmer where he designed custom sensors and optical benches for spectroscopy, thermal imaging and medical devices. He was President and CEO of Optical Coating Corporation where he developed custom Infrared Optical Filters for nondispersive Mid-Infrared (NDIR) instruments. Bob lives in Newton, MA with his wife and three sons.