Automatic machine for real-time detection of contaminants

Abstract

The automatic machine for real-time detection of contaminants is able to determine the content of a liquid phase, although it is the only device that allows for the simultaneous analysis of a compound alongside a machining process on a bench with no efficiency reduction, slowdown or interruption of the production line. The presented invention solves this problem and can be operated remotely.

vacuum chamber

liquid phase

detection of pathogens

quality control

automatic sampling

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Description

To date, there is no technology allowing for the analysis of substance composition simultaneously with the regular operation of a production line. Such a circumstance may engender an efficiency decrease or the interruption of the line. The presented invention solves this problem, and can be operated remotely. The central chamber consists of two semi-cylindrical shells that can slide hermetically in a coaxial manner and retain the base containing the microstructures. Their mutual movement, operated by a computer through an electrically motorized actuator, allows for the controlled filling, draining, drying and the formation of a vacuum inside the machine. A laser is then focused through an optical window on the extremity of the aforementioned structures, which reflect it towards the photo detector for the acquisition of the resonance frequency. The software analyses the vibration amplitude by automatically fitting the resonance curve with a Lorentzian and calculates the frequency and the quality factor.

Applications

The testing and detection of contaminants is an important process in many industries. The presented invention can be used in different areas, starting from quality control in the agricultural and food sectors, in water pipelines, for the analysis of biomarkers in the medical field or the detection of hazardous gases. The machine will enable a faster and more accurate detection of contaminants, meeting the growing demand for pathogen testing systems.

Advantages

The machine for real-time detection of contaminants can perform measurements alongside a machining process without reducing its characteristic efficiency. It is possible to monitor the substance to be analyzed by introducing automated sampling on the production lines. Both sensitivity and reproducibility of the measurement process are high and there is no need for trained professionals to operate this device. Furthermore, automation minimizes the risk of human errors.