

IMPROVING BIOREACTOR PERFORMANCE USING MOBILE SENSORS

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Bioreactors are commonly used in bioprocessing. The dynamic real-time monitoring of some critical culture parameters becomes an essential process analytics tool (PAT) to characterize, qualify and validate the equipment. Mixing efficacy is seen as one of the main features to ensure an efficient outcome of a cell culture or a fermentation process. Inefficient mixing can result in zones of the bioreactor volume where the critical process parameters deviate from the operating range and therefore compromise process performance and quality. Freesense has developed an in-reactor sensor technology to provide data on the culture conditions from the whole internal volume of the bioreactor, which is not possible using traditional inline sensors. The technology consists of a mobile sensor which follows the flow in the bioreactor and measures parameters such as flow, temperature, pH and dissolved oxygen. In a case study, it was demonstrated that the Freesense sensor technology could transmit real-time data on temperature, pH and dissolved oxygen. Feasibility was confirmed in adapting the technology to single-use bioreactors in a biopharmaceutical environment, where the integration of these mobile sensors in a single-use assembly considering a more stringent sterile environment and cGMP conditions was investigated.

The use of this mobile sensor is anticipated in process development (QbD / QRM), supporting process qualification and process validation phases or cell culture monitoring tool for process optimisation or batch release criteria.

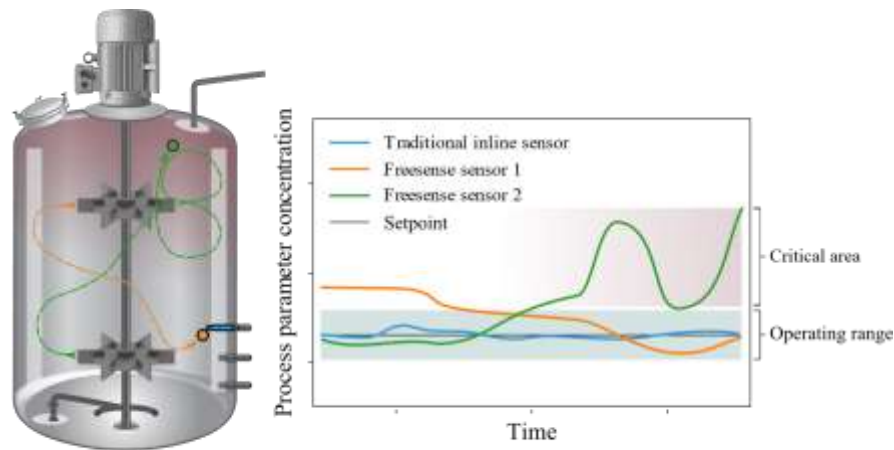


Figure 1 - Illustration of the mobile sensor concept (left) and a potential measurement scenario (right).