

Feed Automation in Microbial Fermentation

Customer

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The research of the Biocatalysis and Bioprocessing group is aimed at environmentally benign and highly productive biotransformations by combining biotechnology, chemistry and reaction engineering in a multi-disciplinary platform.

Challenge

- > Bioprocess: Protein production in yeast
- > Culture feeding: Exact timing had to be implemented to optimize cell growth and protein production
- > Manual feeding was time consuming and prone to error

Equipment

- > [DASGIP® Parallel Bioreactor System with Bioblock](#)
- > DASGIP vessels
- > [DASware® control 5 software](#)

Strategy

Culture feeding was automated based on DO spiking.

Principle:

The DO concentration of the culture medium is influenced by the amount of air supplied to the bioreactor and the oxygen consumption of the growing cells. In the course of the bioprocess run it will decrease, reflecting the oxygen consumption of the growing cells. If the carbon sources are depleted, the cells' metabolic activity and therefore their oxygen consumption suddenly decreases, leading to a spike in the DO concentration. The DO spike therefore indicates substrate depletion and can be used to trigger automated culture feeding.

Implementation:

To automate feeding based on the DO spike, a script was

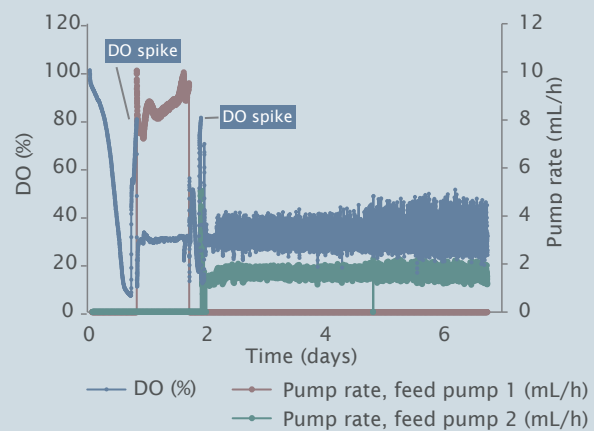
implemented in the DASware control 5 software. The DO spike was defined as the DO sensor readings from a lower trigger point of 25 % to an upper trigger point of 80 %. Upon reaching the upper trigger point, the feed pump was automatically initiated.

Results

The bioprocess was divided into four phases with different carbon requirements:



At the end of the batch phases the DO spiked, because the carbon sources were consumed. This triggered the automated activation of the feed pumps.



Conclusion

Feeding can be carried out manually, but precise timing and extensive experience are required to avoid stressing the cells without a carbon source or committing to 24/7 monitoring. Automation represented significant time and labor-saving improvements.

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Related Information

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