

# Innovative tool for flexible single-use bioprocessing

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## Objective

Development of a multi-purpose single-use bioreactor suitable for high-performance cell cultures and microbial fermentation.

## Introduction

Single-use bioreactors commonly are applied for mammalian cell culture in the biopharmaceutical industry. Compared to the traditional bioreactors they show to be more flexible, diminish contamination risk, simplify validation and do require less infrastructure. This results in a reduction of cost of operation. The innovative CELL-tainer® bioreactor (figure 1) is multi-purpose and suited for both high-density mammalian cell cultures as well as microbial processes leading to cost effective operation.

## Materials and Methods:

Single-use bioreactor (CELL-tainer®), Glucose analyzer (Process Trace), *E.Coli*, *Pichia pastoris*. The control parameters pH, DO, T, rpm and glucose were logged and analyzed.



The PID algorithm in the control strategy was applied to the key parameters pH, DO, glucose and Temperature.

## Results

It is shown that the CELL-tainer® bioreactor is very well suited for microbial fermentation. Figure 2 gives the optical densities measured in a 10L CELL-tainer® batch culture compared with a 1L and 100L traditional stirred tank bioreactor. In all cases the air was enriched with oxygen using DO-control. Without DO-control, the growth is more slowly, but an OD = 75 is reached within 48 hrs. in a glucose controlled fed-batch culture.

Figure 3 shows a *Pichia pastoris* culture (non-optimized) in which the growth is controlled by coupling the glycerol feed to the DO (without oxygen) whereas the DO is kept at values > 10% (air saturation).

## Conclusion

The CELL-tainer® single-use bioreactor is not only suitable for culturing mammalian cells, but

also microbial fermentations can be successfully carried out in this bioreactor. Applying in-line glucose measurement makes the system very well suited for process development.

The CELL-tainer® is an excellent tool for screening purposes, pre-culture application and production of small batches, being more flexible and reducing the risk of contamination drastically.

## Applications and key-benefits

### Applications:

Mammalian cell cultures and microbial fermentation, production of bio-proteins, pre-culture system also for microbial cultures, single-use bioreactor for process development.

### The Key Benefits:

Multi-purpose application, integrated single-use sensors for pH, dissolved oxygen and glucose (and lactate). Integrated process control and SCADA options.

