

Development of bioreactors for the biotech industry

The market for cultivation and fermentation equipment expressing biologicals is huge, growing and profitable. The biological products life time is very long and the market is slow to react to changes and innovation.



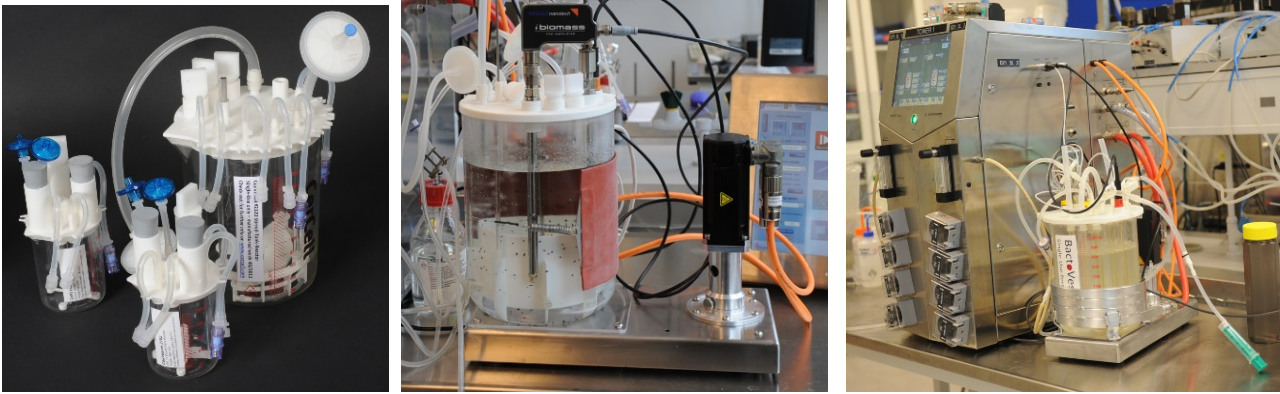
The industry is in several revolutions:

- Continuous Processing - will drive manufacturing cost further down on biological products. Continuous Processing offer 1-2 month cultivation time compared to conventional batch 5-6 days. Saving both time in starting fewer batch processes, reduce contamination risks. Much higher cell density during cultivation will save space and eventual investments required in facilities.
- Open-System to Closed-Systems – converting from flat stacked trays systems to high cell density packed-bed SUBs will drive the manufacturing cost of stem cells for therapeutic treatment and Personalised Medicine down. One significant benefit is eliminating the sterile room saving both investment of 10 k€/m² and the 15 k€ cost/week operating a 100 m² sterile lab for Open-Systems. Introducing Closed-Systems will allow clean room in hospital and others to introduce the Personalised Medicine concept. Cost of stem cells today range 30-40 k€/g and desperately need to be lowered significant before the expected revolution of therapeutic treatments will occur.



The present cell cultivation technology is some 25 years old and in many ways highly optimised. The processes dominating the market is classic batch cultivation over a period of 5 - 6 days increasing the cell density from app. 0.05 mio/ml to 5.0 mio/ml. The process equipment is mostly made of glass and stainless steel with only temperature, dissolved Oxygen and pH sensors.

The driving force for the development of Single-Use-Bioreactor (SUB) technology is the needs of the biopharma business. Over the last decade it has become clear that the old paradigm of block buster drugs is over. The future health care market will focus on therapeutic treatments for a larger number of smaller patient groups. Flexibility and significantly reduced development and manufacturing cost is the driving factor for the development of the equipment business.



The Atlantis FP6 and HESUB FP7 research projects inspired Stobbe Group to develop new business opportunities through the following daughter companies:

CerCell - www.cercell.com - developed a range of single-use product lines:

- **CellVessel** - features a series of configurable SUBs (Single-Use-Bioreactors) substituting the present glass/steel STR (Stirred-Tank-Reactors) though maintaining the batch and fed-batch processes presently in use
- **BactoVessel** - is the world first configurable SUF (Single-Use-Fermenter) for microbial fermentation for batch operation
- **CellTumbler** - a simple and reasonable cost wave-bag system

PerfuseCell - www.perfusecell.com - developed a range single-use product lines:

- **CerCore** based SUB's for continuous cultivation of mammalian cells operating at cell density levels of >150mio cells/ml expressing antibodies. As the living conditions for the cells are more physiologically correct, the specific productivity is increased by as much as 40 %. Operation time of more than a month with constant high cell viability is documented so far.
- **CellMembra** perfusion system for cell retention operating at 25-60 mio /cells/ml.

ProlifeCell - www.prolifecell.com - developed a range single-use product lines:

- **CerCore** based SUB's for continuous proliferation of stem cells operating at cell density levels of 50 mio cells/ml with continuously harvest of stem cells for therapeutic treatments or for mass production of stem cells for human organ 3D printing.

PumpCell – www.pumpcell.com – development and marketing of Single-Use-Pumps

- Mnemosyne diaphragm pumps and Hera families of and peristaltic pumps

Cronus-PCS – www.cronus-pcs.com – development and marketing of fully a configurable Process-Control-Systems for process control of advanced bioreactors and fermenters.

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