Economic Impact of Adopting Single-use TFF Flat Sheet Cassettes
Stephanie Wickham and Brent VanRite
14MAR17
Who We Are

- Biopharma Contract Development & Manufacturing Organization (CDMO)
  - Serving the pharmaceutical industry from drug development to vial filling
  - Clinical material supply for biological drug developers: antibodies, therapeutic proteins and enzymes
  - Mammalian, microbial, transgenic, and flex project manufacturing platforms
- 180+ employees with 28 PhDs
- 100,000 ft² of laboratories and manufacturing facilities with expansion space
A Brief History

2005 - 2007
Process Development, cGMP Cell Banking, Analytical Lab Services.
885 Mammalian Manufacturing Facility built and commissioned
Added 100 L & 500 L Mammalian Bioreactors

2008 - 2009
Continued growth in
- Process & Analytical Development
- Quality Services
- Manufacturing
- CYT employees
Multiple 100 L & 500 L Phase I/II Clinical GMP Runs

2010 - 2011
Introduced Microbial Manufacturing Services
PD & MFG expansion into Genzyme labs and cleanrooms
Great Point Partners capital Infusion

2012
1,000 L Bioreactor brought online
Increased purification capacity
Added 50 L & 200 L Sartorius Disposable Bioreactors (SUB)

2013
200 L Microbial Manufacturing Expansion
Added 250 L & 1,000 L Hyclone Single Use Bioreactors Systems
Validated Transgenic DSP Manufacturing Facility

2014
Automated Fill Finish Service Validated and Online
Phase III CTM production
Process Validation (Conformance) Campaign Performed

2015
3500 Facility Online
Process Characterization Online
1,000 L Microbial Expansion Underway
5,000 L Bioreactor Project Initiated
Hepalink Purchases Cytovance

Cytovance: One-stop-shop

- R&D Services
- GMP Mammalian Manufacturing
- GMP Microbial Manufacturing
- GMP Flex Suite Manufacturing
- GMP Clinical Drug Product Vial Filling
- Drug Substance and Drug Product Release and Stability Testing

Our scientists have developed processes for a wide variety of biologics using both microbial and mammalian platforms.

- >50 Biologics and >14 Disease Areas
- Biosimilars
- Transgenic
- Fusion
Benefits of Single-Use TFF Technologies

1. Scalability
2. Efficiency
3. Decreased production time
4. Cost Comparison
Scalability

Traditional TFF Cassettes:
1. 0.01-2.5m² bricks
2. CRC and PES Membranes

Repligen TFF Cassettes:
1. 0.01-2.5m² bricks
2. PES membranes
   A. Prostrem
   B. Hystream

Competitors Single-Use TFF Cassettes:
1. 0.01-2.5m² bricks
   A. Not always stackable
2. PES membranes
Efficiency

Traditional TFF Cassettes Operations
1. Installation and Pressure hold
2. WFI Flush
3. Sanitization
4. WFI Flush and NWP Testing
5. Equilibration
6. Concentration
7. Diafiltration
8. Cleaning
9. WFI Flush and NWP Testing
10. Storage

Single-Use TFF Cassettes Operations
1. Installation and Pressure hold
2. WFI Flush
3. Equilibration
4. Concentration
5. Diafiltration

Single-use TFF cassettes increase efficiency in eliminating pre- and post-use cleaning and storage
• Use of Repligen’s TFF insert has eliminated the need for cleaning and testing of the TFF holder.
• **No Cleaning Validation required for membranes or holder.**
• Usage of TangenX holder with filter plate insert allows flexibility in configuration customized per project.
Cost Comparison

Converting an existing traditional CRC TFF process to TangenX PES TFF.

Traditional Cassettes
6x2.5m\(^2\) bricks = ~$11.2k each =

TangenX Cassettes
6x2.5m\(^2\) bricks = ~$2.5k each =
Case Study

Converting an existing traditional CRC TFF process to TangenX PES TFF.

Traditional CRC Cassettes had a capacity of 65L/m² with 3 uses before NWP dropped below 70%.
6x2.5m² bricks = ~$11.2k each = ~$67k

TangenX PES Cassettes had a capacity of 72L/m²
5x2.5m² bricks = ~$2.5k each = ~$12.5k x 3 = ~$37.5k
Converting an existing traditional CRC TFF process to TangenX PES TFF dropped raw materials cost by almost ½ and removed days of suite time for cleaning results.
• Repligen’s Single-Use TFF cassettes exhibit the same scalability as traditional TFF cassettes
• Repligen’s Single-Use TFF cassettes exhibited the same if not slightly better capacity for processes transferred with the traditional CRC membranes.
• Single-Use TFF cassettes and Filter Plate Inserts offer:
  1. Increased efficiency in the reduction of pre-use and post-use steps
  2. Increased efficiency in the reduction of equipment cleaning
     A. No cleaning validation
  3. Decreased single cost compared to traditional TFF Cassettes
  4. Decreased cost for fouling prone TFFs like microbial refold
  5. No validation of storage of cassettes post-use