



Implementing Single-Use TFF Membranes into a CDMO

June 19th, 2018

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Overview



- Introduction
- What is TFF?
- Advantages of Single Use Technologies
- TangenX Sius cassettes
- Summary
- Conclusion

Fujifilm is a Healthcare Company



changing lives

- Digital Radiography
- Endoscopy
- Minimal invasive Surgery
- Ultrasound
- Regenerative medicine
- New Drug Development
- **CDMO**

World Leading CDMO



3

Technologies

*Microbial
Mammalian
Viral / gene therapy*

6

LICENSES

*For commercial
manufacturing*



+310

Projects

*In process
development and/or
manufacturing*

26

PC/PV Projects

Completed

25+

YEARS

*Of Biologics
CDMO experience.*

FUJIFILM Clinical Journey



Pre-Clinical development
Gene Expression &
Strain / Cell Line Development
Process Invention
Pre-Clinical
Manufacture



Late Phase
Process
Characterization
Process Validation
Late Phase cGMP Manufacture
Stability



Clinical development
Process Development
& Optimization
Analytical & Stability
cGMP Manufacture
Fill/Finish – Viral/Gene Therapy
Products



Commercial Production
Post-approval Activities
Product Life Cycle Management

Our Cell Culture Experience

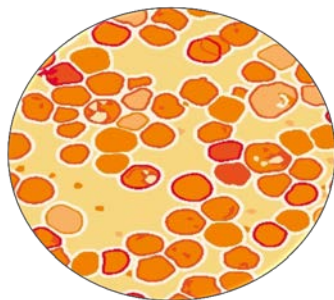


14+

Cell lines created

55+

CHO Programs



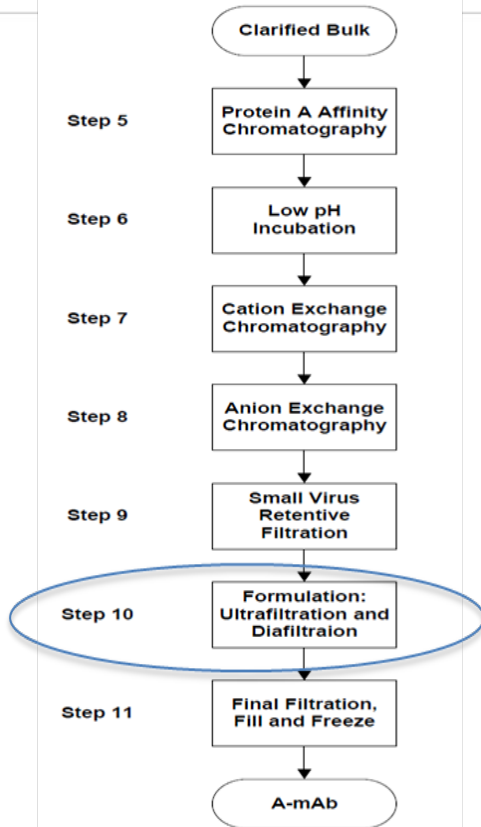
10

Baculovirus
Programs

1

Commercially Approved
Cell Culture Product

mAb Process Design

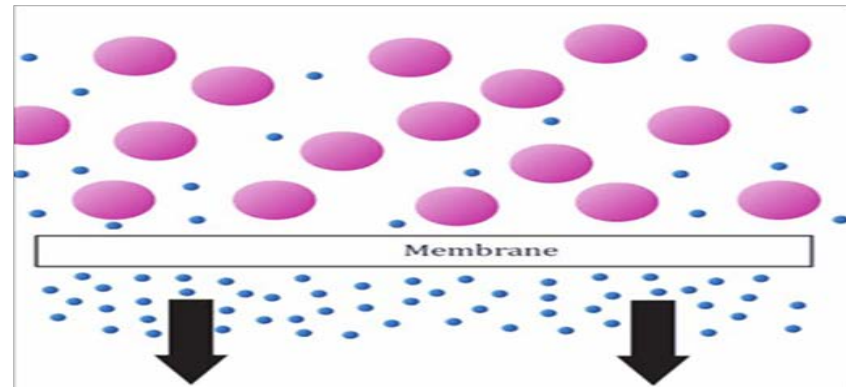
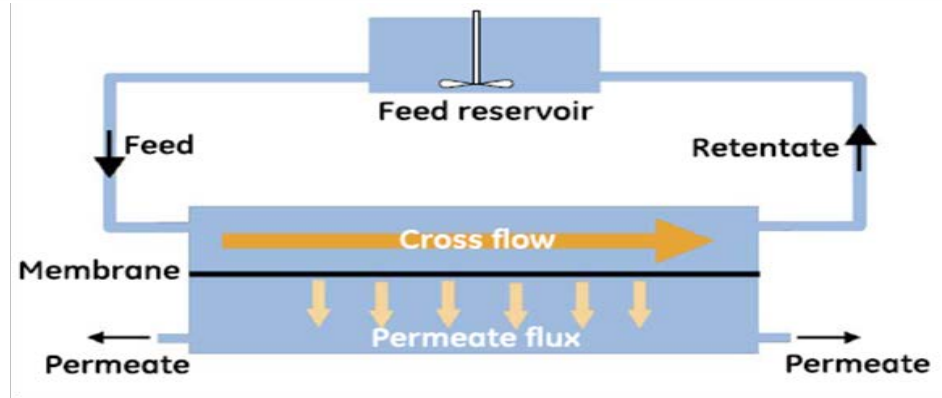


Reference: "A-Mab: A Case Study in Bioprocess Development",
CMC Biotech working group, version 2.1, 30Oct2009

TFF Basics



- Upstream
 - Cell Harvesting
 - Cell or Lysate Clarification
- Downstream
 - Concentration
 - Buffer Exchange



Advantages of Single Use Technologies



- Multi Product Facility
 - Eliminates Cross Contamination
 - Elimination of Cleaning Requirements
- Ease of Transfer Between Facilities
 - Multi Facility Transfers
 - FDBU ↔ FDBK ↔ FDBT
- Significant Time / Cost Savings
- Lower Capital
- Disposable Chrom / TFF Skids, pre packed columns, membrane absorbers
- Well Suited for Early Phase Programs / Small Scale Processes

Time Savings of Single Use



- Traditional Cassettes

- Installation
 - WFI Flush
 - Integrity Test
 - Sanitization
 - WFI Flush
 - NWP Testing
 - Equilibration
 - Concentration
 - Diafiltration
 - Post Use Sanitization
 - WFI Flush
 - NWP Testing
 - Storage
- 2-3 Hours
- 2-3 Hours

- Single Use Cassettes

- Installation
- WFI Flush
- Integrity Test
- Equilibration
- Concentration
- Diafiltration

Benefits of Single Use TFF Membranes in PD



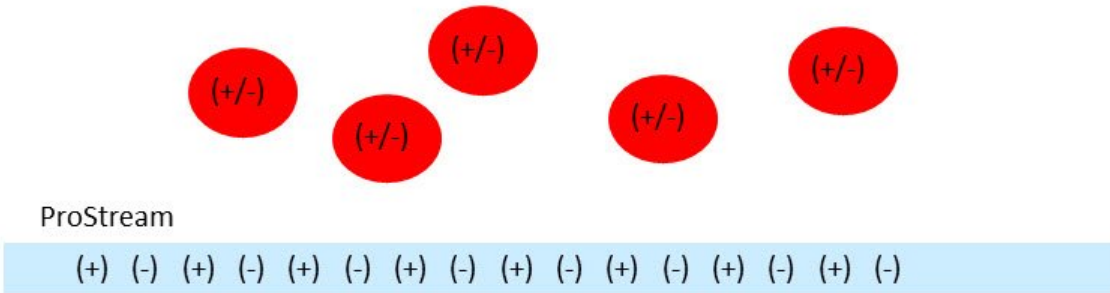
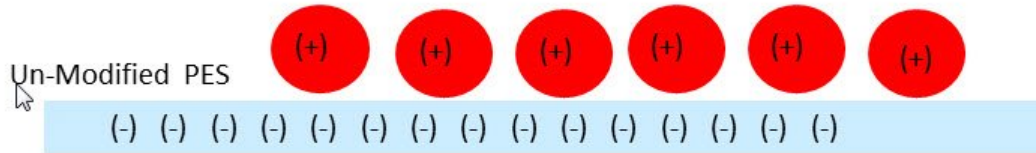
- TangenX SIUS single Use Cassettes
- Membrane Holder Compatibility
 - Fits current popular cassette holders, no purchase necessary
- Decreased WPU usage
 - No Need to Rinse Out Preservatives
 - Can Go Straight to Sanitization
 - No NWP needed for Pre or Post Use
- Release membrane Integrity Test when possible
 - Supplied Certificate from Repligen
- No Post Use Sanitization/NWP/Storage
 - Remove Membrane and Toss

Benefits of Single Use TFF in Manufacturing



- Multi Product/Multi Client Facility
- Multi Equipment Facility
 - Stainless vs Single Use
 - TangenX SIUS will fit our current stainless and single use holders
- No NWP's in the plant
 - Manufacturing personnel love this
 - Less WFI usage
- No post use for Single Use Holders/flow path
- Still Post Use if Using Stainless Holders
 - After Sanitization, no Storage
- No storage of membranes till next campaign

TangenX SIUS membranes



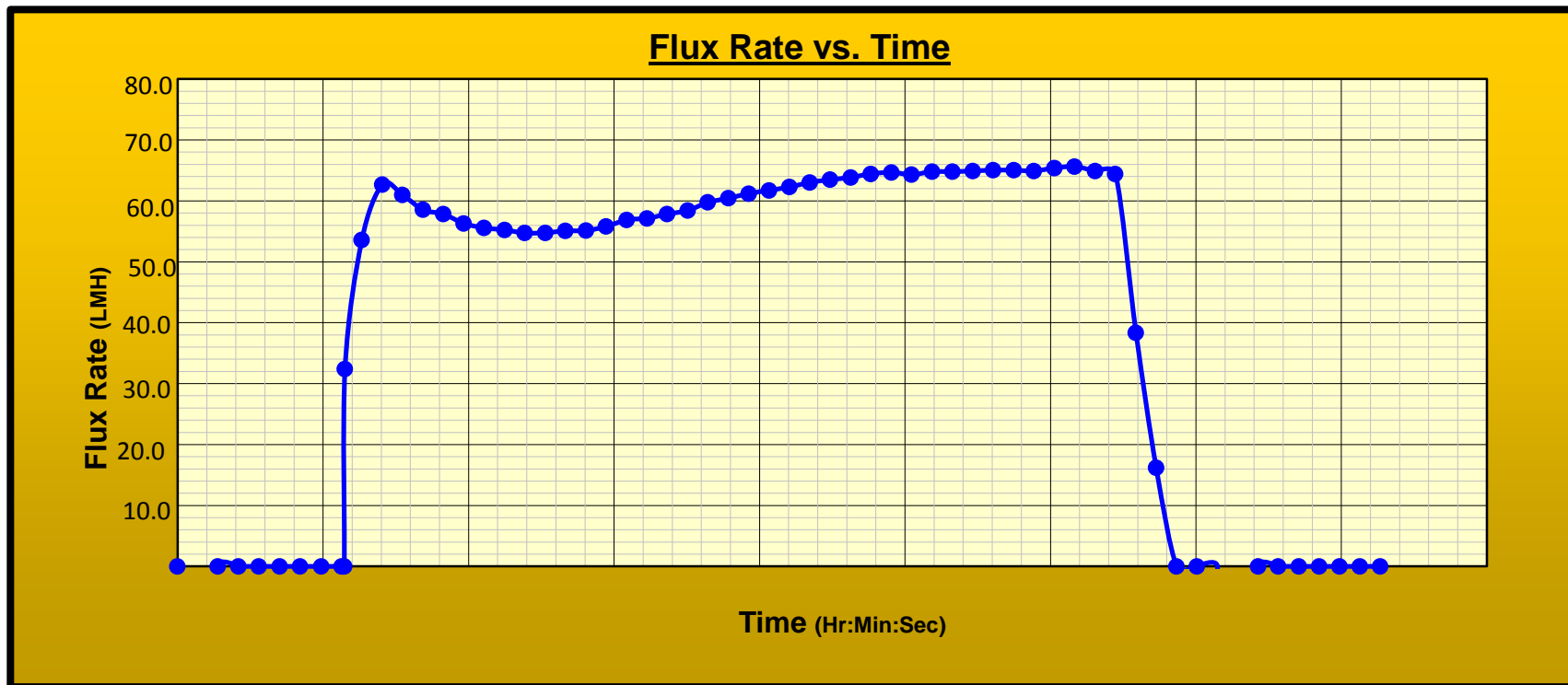
ProStream is neutrally charged, which minimizes non-specific protein binding.
Unmodified PES has an inherent negative charge and will have non-specific binding.
Source: TangenX Website

TangenX SIUS membranes

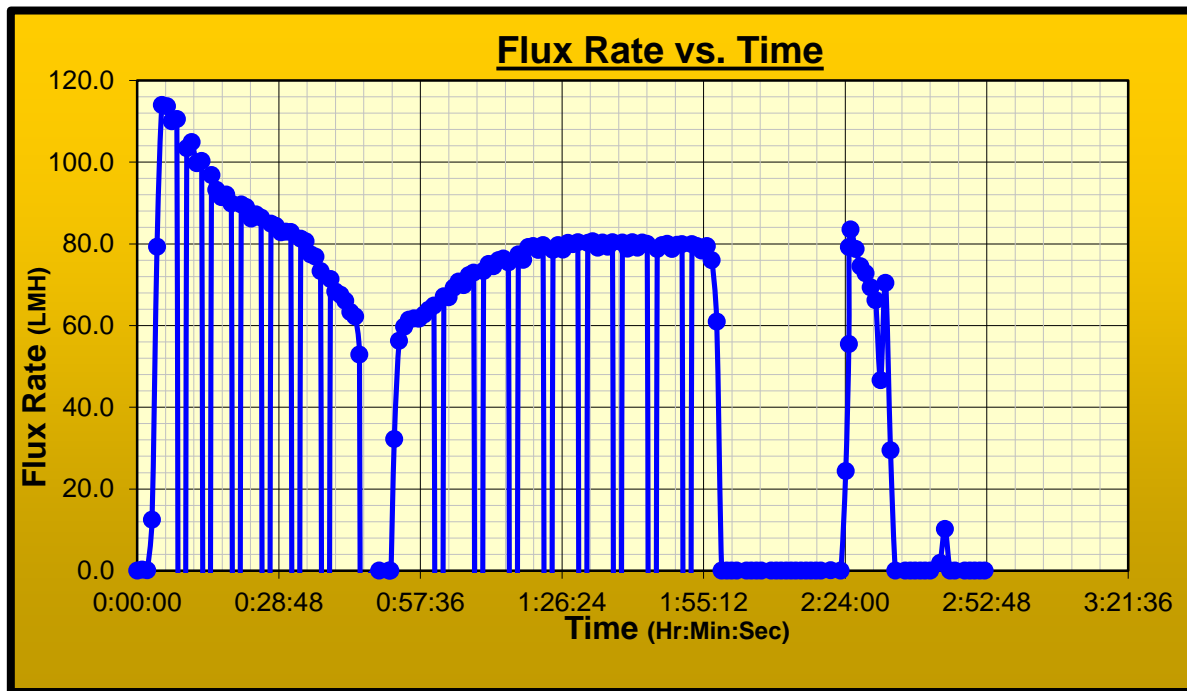


- ~70-80% reduction in cost vs re-usable
- Successful in various ranges
 - 50 – 600 g/m² membrane load
 - Up to 50x Concentration Factors
 - Scaled from 0.01m² to 15m²
- Compared against re-usable
 - Equivalent Flux and Yields

Flux DATA with a 10X Concentration, 0.01m²



Flux Data with 10x Concentration, 1m²



Conclusions



- Equivalent to re-usable cassettes
- Decreased Risk for Contamination
- Time Savings in PD and Manufacturing
- Cost Effective for a CDMO
 - Small campaigns
 - Quick



Thank You!

