

Innovations in Single-Use Bioprocessing Components

New technologies facilitate enhanced single-use processes and procedures.

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Recent advances in single-use technology have helped facilitate improvements in upstream and downstream processing. If selected appropriately with the end product in mind, some technologies can drastically improve manufacturing productivity and speed time to market.

“Although the idea of single use is not new, and has become standard practice for filter capsules and storage bags, modern single-use processes are more complex and comprise an integrated production concept in new facilities or the replacement of stainless steel in existing ones,” Stefan Schlack, senior vice-president of marketing and product management, Bioprocess Solutions at Sartorius Stedim Biotech, said in the August 2014 issue of *Pharmaceutical Technology Europe*. “Single-use bioreactors, for example, didn’t exist 20 years ago, and the technology has gone from evolution to revolution in less than two decades (1).”

“Single use demands greater levels of commitment as manufacturers increasingly depend on their technology providers: A completely different assurance of supply concept is essential,” added Schlack.

Recent trends in single-use components include enhanced contact layers and bag functionalities and superior clamps, valves, and adapters.

PROTECTIVE BIOPROCESSING FILMS AND BAGS

“The growing usage of single-use bags in all crucial process steps of commercial production of biological drugs drives the need for improved quality, robustness and assurance of supply, more robust change control, and more robust business continuity,” noted Schlack.

The Flexsafe bag, a ready-to-use, single-use bag made of polyethylene from Sartorius Stedim Biotech, enables both upstream and downstream bioprocessing in one bag and ensures reproducible cell growth of even the most sensitive cell lines.

Flexsafe boasts a 400- μ m thick multi-layer proprietary polyethylene film called S80. The material was

developed in close collaboration with resin and film suppliers and can be used for a range of applications, including liquid shipping and large-scale stirred bioreactors, the company reports.

Extractable and leachable profiles remain consistent for a product’s lifecycle many years after launch, and Sartorius Stedim Biotech guarantees consistent supply of its bags as a result of long-term contracts with suppliers and stock continuity plans. The company will first roll out FlexSafe RM bags (1 L-200 L) for validation purposes. Then, the company will release BIOSTAT STR bags for single-use bioreactors (50 L-2000 L).

High-volume biopharmaceutical single-use containers are prone to leaks, and EMD Millipore’s new film, PureFlex Plus, helps provide maximum leak resistance, the company reports. The film, which is suitable for use throughout the entire manufacturing process, is designed for applications in which abrasions, punctures, stretching, or tearing may occur. The product can be used throughout the entire production process, reducing validation and implementation efforts.

Compatible with Mobius (EMD Millipore) single-use process containers, PureFlex Plus coextruded, medical grade film features a linear low-density polyethylene outer layer and an inert product contact layer. The company’s EZ fold technology enables the flexible films to be filled in a bin without operator manipulation or the help of a hoist.

When fluids are introduced into single-use bioprocess bags, creases, folds, and twists in the bag material can introduce problems. ASI-Life Sciences’ E-Z Deploy Bag Configuration offers a solution to improve the loading of single-use bioprocess bags into tanks and equipment. The simplified folding of the bags safeguards against uneven bag filling when fluids are introduced. This unfolding action eases single-use bag implementation for large applications and improves system efficiency.

The E-Z Deploy Bags bioprocess bags are available in 1000-L and 5000-L sizes, are delivered sterilized and ready for use, and are configured so that they fill in place with little to no user interaction, the company reports.

CONNECTORS AND FLOW-PATH COMPONENTS

Colder Products Company's combined genderless AseptiQuik G sterile connector and Steam-Thru II Steam-In-Place (SIP) connector allows for direct connection to stainless processing equipment, offering users increased flexibility in plant configuration and process design. The genderless connection allows customers to use the same bag system and tubing manifold SKUs on both hybrid and complete single-use systems.

A sanitary clamp connects the separate technologies together. The Aseptic G half of the connector can connect to a wide range of single-use systems and does not have to be configured with a particular mating connector. AseptiQuik G STC Connectors are available in both a high-temperature version for gamma or autoclave sterilization and a standard version for gamma sterilization.

Meissner's Single-Use Gauge Tee (SGT) connector ensures secure pressure monitoring. The thermoplastic elastomer diaphragm on Meissner's SGT attaches standard sanitary pressure gauges and transducers together in a sterile environment reducing the worry of cross contamination. The SGT monitors system pressure, and gauges and transducers can be removed aseptically for offline calibration during processing.

The SGT is suitable for single-use assembly flow paths and can

be seamlessly integrated into Meissner's presterilized BioFlex tubing assemblies. Because the SGT is injection molded from the same polypropylene material as Meissner's UltraCap H.D. capsule filters, the number of fluid contact materials that are introduced into a single-use system are reduced.

BioPure's BioBarb valves are designed to imitate the full-bore diameter of a molded connection and address the industry need for affordable single-use adapters, the company reports. BioBarb delivers a smooth transition from tube to adapter via an unimpeded flow path, allowing complete drainage while reducing turbulence and entrapment.

The hose tail to tri-clamp adaptors are packaged in an ISO Class 7 cleanroom using DMF-listed polypropylene that is compliant with *United States Pharmacopeia* Class VI and the *European Pharmacopoeia* and are traceable with molded-in-production lot and size identification.

To prevent contamination when sampling fluid from aseptic and sterile processes, NovaSeptum single-use holders from EMD Millipore can be filled with any type of con-

tainer using a 2 mm trigger. They are designed to be used with NovaSeptum sampling units either in single-use assemblies or in combination with multi-use equipment.

THE RIGHT PRODUCTS AT THE RIGHT TIME

Manufacturers must acclimate to the market and keep up with the ever-changing trends in technology to ensure maximum efficiency of processes. Adoption of bioprocessing techniques will continue to increase, and companies will need to refine and optimize their systems and procedures. Having the appropriate products available at the right time in the proper quantities can help companies remain competitive. "For biopharmaceutical manufacturers, capacity adaptation is crucial. If demand suddenly increases and the required product cannot be made in the right quantities, a company is not just facing a loss of short-term sales, but long-term market share as well," Schlack concluded.

REFERENCE

1. S. Schlack, *Pharm. Tech. Europe* 26 (8) 41 (2014). [BP](#)

For more information on these products, please visit:

ASI-Life Sciences
Colder Products Company
Meissner

BioPure
EMD Millipore
Sartorius Stedim Biotech

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