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Four best practices for single-use supply chain success

Flexible and cost-effective, single-use technologies offer biopharmaceutical companies a way to transform their biologics production and meet the growing demand for these life-changing therapies. In fact, more than 45% of clinical mammalian cell culture processes and about 6% of commercial processes now use single-use technologies.

Single-use systems manufacturers must rely on a wide range of components, from filters and connectors to elastomer tubing and process sensors. A supply chain issue that impacts any one of these components creates the potential for delays in moving these critical therapies to market.

For biopharma companies that adopt single-use systems (SUS) and single-use technology (SUT), the key to reducing supply chain risks is to build a robust, dependable global supply chain early in the design phase. In addition, it is important to consider these supply chain decisions for any materials, components and assemblies used in manufacturing workflows.

Choosing the right single-use partners can ensure a successful, sustained implementation of single-use in critical cGMP manufacturing and other operations. Biopharma companies should consider these four best practices as they develop and manage their single-use supply chain.

#1: IMPLEMENT A DUAL- OR MULTIPLE-SOURCING MODEL FOR COMPONENTS

Biopharma manufacturers that incorporate single-use products and systems have often followed a dual- or multiple-sourcing strategy. For this, a developer will provide the same design or an assembly or component and request bids from two or more single-use equipment providers. By selecting multiple single-use equipment providers, biopharma manufacturers add a critical redundancy that can bolster their supply chain, increasing the chance for guaranteed delivery of essential products or components, no matter the circumstances.

The use of multiple single-use equipment providers, however, does not create a fully redundant supply chain, leaving a biopharma manufacturer still at risk of a disruption. For example, if the exact same single-use design is being provided by two or more single-use providers, they may both rely on the same raw material supplier(s) for a critical subcomponent, such as a particular tubing, filter or connector. If production is hampered for that particular raw material supplier, both single-use providers would be at risk, as well as the biopharma manufacturer's supply chain.

Furthermore, as more manufacturers adopt single-use technology, demand for components (such as gaskets, filters, bags and tubing) increases, potentially limiting material supply. Additionally, a specific brand of component may be specified for use each time. If the brand-name material provider runs into a shortage, this can introduce additional risk.

To overcome these challenges, biopharma manufacturers can build a more robust supply chain by establishing a part specification that defines material and performance properties, rather than selection of a single source of raw material or component. This practice provides a more flexible alternate sourcing that helps limit risk.

#2: FIND STANDARDIZATION OPPORTUNITIES

The customization and flexibility of single-use assemblies can be a benefit for biopharma manufacturers — but it can also create supply risk. The development of standard assemblies for unit operations can lower the number of potential designs and consolidate assemblies across an organization. Global manufacturers with multiple manufacturing sites have the greatest opportunity to develop standard assemblies for unit operations.

Image caption: Collaborating with a single-use vendor first, early in the design process, and using good design principles can help identify potential problem areas, bottlenecks or supply or sourcing issues.

By establishing a comprehensive supply chain strategy as early as possible, a biopharma manufacturer can mitigate its risk. Engaging with single-use vendors can help a biopharma manufacturer better understand their unit operations and design assemblies. As a result, they can identify critical materials and components, as well as where specific components may be at risk, then take that into account as they consider standardization.

Employing sound industrial design principles and system requirements for the application at hand can also help reduce risk. Manufacturers can reduce the number of issues they face by anticipating scale-up challenges as they design their single-use systems. By designing each system for full GMP production at the pilot scale, manufacturers can better identify and eliminate a potential hurdle later. This will help identify manufacturing bottlenecks or sourcing and supply issues so they can be addressed before components are specified, drawings are created and manufacturing has begun.

Image caption: Biopharma manufacturers should continuously evaluate a single-use supplier's capabilities, including their supply chain management and quality systems.

#3: EVALUATE A SINGLE-USE VENDOR'S QUALITY STANDARDS

The unavailability of parts or components isn't the only type of disruption manufacturers face: If single-use systems are produced but cannot be safely or consistently implemented in cGMP manufacturing environments, then the drug manufacturer can face an impact that is just as — if not more — severe than having delays stem from missing parts.

When selecting a single-use products and technology vendor, consider these criteria for regulatory and quality compliance.

Clean room management.

Single-use systems will typically be manufactured in an ISO Class 7 (Class 10,000) clean room. The production facility should be able to supply documentation of annual clean room recertification and a validated process showing a rotational cleaning regimen. Clean rooms should be monitored for real-time temperature, humidity and differential pressure, with alert criteria and defined actions in place to address issues. In addition, the facility should be able to demonstrate its processes and scheduling of air/surface viable and nonviable particulate testing

Product sterility validation.

The single-use vendor should follow a well-defined, recognized reference standard identified by regulations such as ANSI/AAMI/ISO 11137 (commonly referred to as VDmax25). However, single-point validation is insufficient. The manufacturer should have revalidation documentation, showing that it is routinely performed according to the standard and the single-use supplier. For irradiated products, sterile barrier packaging validation (different from sterility validation) can also be used to establish shelf life.

Lot release testing.

It is important for the supplier to test finished products to verify that the product meets certain requirements after sterilization. Driven by downstream applications after filtration, most requests for this testing include USP <85> for bacterial endotoxins and USP <788> for particulate contamination.

Quality documentation system.

Proper documentation is critical: It's not enough to simply state that tests are conducted; each vendor must provide tangible, referenceable proof. A biopharma manufacturer should not only ensure its vendors document their quality processes and systems but should see evidence that the documentation is being used on a regular basis. Conducting on-site audits at set intervals is essential for ensuring proper validation.

Quality risk management (QRM) program.

Single-use suppliers should use a systematic, documented process for the assessment, control, review and communication of quality risks to manufactured products. Just like biopharma manufacturers, the best single-use vendors will invest in this type of critical program.

A good QRM program, as a best practice, should include routine risk-based audits of raw material suppliers. This can help biopharma manufacturers understand the quality management capabilities and processes of these vendors. Audits should be followed by a risk-based classification of each supplier. A tool such as a risk register can be used to track, identify and review the greatest potential for risk.

To help drive continued improvement, track suppliers in a measurable and accurate way with quality agreements and performance reports. On-time delivery, turnaround time for documentation (such as drawings or quality documents) and manufacturing defects should be metrics that are regularly identified and tracked.

A final consideration for a vendor's QRM program is an internal business continuity plan to reduce supply chain risk. This could include a business impact analysis (BIA) report of potential scenarios associated with business continuity and disaster recovery, as well as relevant plans of action. This element ensures the vendor has a method for responding to a serious, operation-interrupting event.

As biopharma manufacturers redesign facilities to expand use of single-use systems, they will benefit from understanding and aligning their own quality practices with a supplier's capabilities. A single-use supplier's knowledge of industry regulations and quality standards can make a difference in how effectively a drug manufacturer can adopt single-use in their operations. Ideal single-use suppliers should be able to go beyond demonstrating that they can comply with regulations and quality standards; rather, they should have a deep understanding of the regulatory process that can help their partners navigate potential production roadblocks.

#4: ADOPT A COLLABORATIVE PLANNING, FORECASTING AND REPLENISHMENT (CPFR) PROGRAM

Biopharma manufacturers can also face a challenge with lead times for finished goods. Although stocking finished goods is one strategy that can help address this challenge, it comes with associated costs for proper storage of large volumes of products.

Companies with global operations may choose to find alternate solutions for local storage and quick delivery. Working with single-use suppliers who have a worldwide network of distribution centers, backed by strong logistics support and access to an open-architecture product portfolio with components sourced from multiple suppliers, can further help reduce potential risks.

In addition, biopharma manufacturers can enhance SUS supply chain management by working with suppliers in CPFR programs. This collaborative effort can effectively support manufacturing planning and ensure that orders are delivered on time.

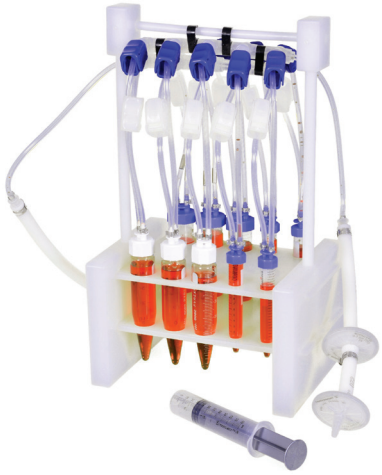

Image caption: A single-use supplier's supply chain expertise and ability to comply with regulations and quality standards can ensure that a biopharma manufacturer can successfully move a single-use system from pilot scale to full, cGMP production.

A single-use vendor's typical four-step CPFR program would:

- Fully understand customer requirements, including the product/order attributes of dating, documentation, order frequency and lot control, as well as requirements for storage material handling
- Effectively transfer documented requirements to internal systems to operationalize items, such as customer care instructions, warehouse instructions and setup of customer-specific inventory
- Regularly engage in customer planning meetings to obtain updated forecasts
- Collaborate with customers and suppliers to manage changes in key factors, such as lead times and required components

A single-use vendor might also offer additional procurement and supply management programs, such as on-site services and technology, custom kitting solutions and ancillary supplies for production. These programs can help biopharma manufacturers streamline procurement, optimize inventory levels and spend less time on supply management.

THE GOAL IS TO AVOID SUPPLY CHAIN DISRUPTION

Relying on multiple suppliers for critical components and materials isn't enough to fully mitigate single-use supply chain risk. Instead, true redundancy must be built into the supply chain. This includes careful attention to system design, choosing a reputable single-use vendor and fully understanding their supply chain strategy and quality systems. Ensuring true redundancy also includes collaboration with that vendor early on and throughout the design and implementation process.

Biopharma manufacturers can use these four best practices to avoid the worst-case scenario of being dependent upon a supplier whose own sources of components or materials could be threatened. Ultimately, a robust single-use supply chain strategy can reduce contamination risk and improve resource efficiency — and lead to breakthrough solutions for many of the world's most challenging diseases and chronic conditions.

ABOUT THE AUTHORS:

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