Single-use systems: Globalizing best practices and technology specifications

How does your global company share internal expertise, best practices and specifications? Do you have platform technologies globally? Is it easy to find out what has been learned at other manufacturing sites? If not, opportunities exist for speed to market, elimination of redundant work, and cost savings.

By
Jason Nisler

Bioprocessing Application Specialist, Colder Products Company

Imagine, within your global manufacturing company, three separate engineering teams are performing the same single-use connector study to evaluate extractables and product performance — simultaneously. The study will take one to two months to complete. Located in Singapore, Germany, and North Carolina, the teams are unaware of their overlapping efforts, until a key supplier notices the redundancy and informs them.

The engineers did not know their colleagues' names within their manufacturing network, much less their areas of technical focus. Had the engineers known that cross-site coworkers were working on the same project, they could have collaborated to speed up all three project timelines, or used the additional resources to tackle a process optimization and improvement project. Instead, all three groups continued down the same path, as they always did, with three separate timelines, three separate facilities doing the testing, three separate risk evaluations, and three times the cost.

The three-team example, based on a true story, demonstrates what can happen when the work of multiple global manufacturing sites is uncoordinated. Forward-thinking global biotech companies are addressing this issue by developing communities of practice. Such teams coordinate global process development efforts and identify, share and leverage worldwide best practices and specifications for each manufacturing network (i.e., similar manufacturing facilities and product lines).

THE CHALLENGES OF MANUFACTURING MULTI-NATIONALLY

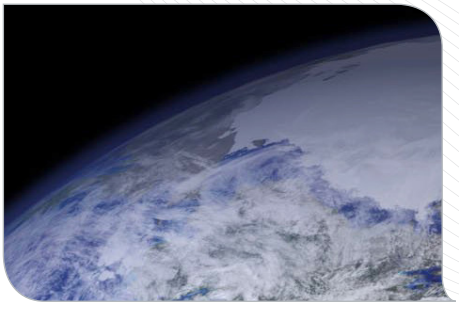
The increasing relevance of global markets, especially emerging markets, is causing an increase in the number of manufacturing sites within a company. Instead of centralized manufacturing sites shipping worldwide to customers, manufacturing is becoming regionalized and closer to customers. With that, the following challenges are magnified:

Lack of resources

One struggle when starting up new manufacturing sites is finding the highly skilled experts needed for the industry. Adding sites often fragments the production expertise that does exist and finding experienced talent is not easy due to the high need and limited availability. Thus, the talent and expertise within a multinational company needs to be used and shared as efficiently as possible.

Lack of experience with single-use systems

At the same time, the increasing use of single-use systems (SUS) to run entire processes within GMP manufacturing is creating the need for SUS expertise. Single-



use technology (SUT) has only been used at manufacturing scale for about 10 years. Relative to other technologies, SUS are new and experience can be limited. Knowledge of SUS within this space varies greatly from company to company, site to site, and person to person.

Limited SUS experience at some regional sites can delay product launches when additional time is needed to account for learning curves and develop process specifications. Developing the process designs and validating those site technologies to meet the project requirements is time intensive. If expertise already exists within the company (e.g., the process has already been developed at another site or a SUT already has been validated), the front-end design time can be significantly shortened.

Process risk

Lack of experience and expertise can introduce risk to the drug manufacturing process or add to the risk of product contamination. Each time a new process is developed or a new technology is used, the process and product are vulnerable to contamination and extensive time is required to "debug" the design. Replicating validated processes and technologies from other sites is one way to reduce contamination risk.

Redundant resources

While coordinated efforts are more likely to happen on the research side, collaboration does not always occur with manufacturing. The earlier example of three global teams working on the same exact project is a good illustration of the redundancy that can occur when process development studies are not coordinated centrally.

Resources are also inefficiently used when a customized solution is developed for each manufacturing site. With cost estimates of over $1 billion[1] to bring a drug product to market, resources are critical to drug companies. Time spent customizing solutions can be avoided multiple times over if one manufacturing site develops the best practices and specifications and other sites leverage those successes.

Higher costs

Customized processes and technologies for each manufacturing site add costs in a number of ways: not taking advantage of suppliers' reduced cost of scale; costs of running redundant, unnecessary tests; and the opportunity cost of not using human resources productively.

GLOBALIZING BEST PRACTICES AND SPECIFICATIONS

Ultimately, to address the challenges above, global coordination is needed. Best practices and specifications need to be identified and implemented across manufacturing networks. This is referred to in the biotech industry as developing platform technologies, harmonization, or technology standardization.

Sharing and leveraging company expertise achieves a number of business benefits, including:

- Quicker time to market by using existing knowledge to speed decisions, eliminating redundant activities and leveraging replication of existing processes. For instance, process manufacturing teams can conservatively save the 2-10 weeks on vendor component design and engineering review by simply utilizing existing vendor drawings and part numbers.
- Lower probability of process troubleshooting during startup
- Conservation of human resources by eliminating redundancy and sharing prior knowledge
- Decreased costs by reducing testing needs and purchasing at global scale

HOW TO IMPLEMENT GLOBAL STANDARDS

Form a Global Standards Team

The key is to form a team. There are options for how it can be done. Typically this is a multi-department group that interfaces with the most number of manufacturing sites. In one company where this has been implemented, one point person leads a team of designated subject matter experts (SME) from each of the multiple sites. In another

company, one person is designated to travel from site to site to collect and share global learnings and technology advancements.

Collect and House the Expertise

One way to promote sharing of internal expertise is the formation of a group of multi-site SMEs (subject matter experts), often referred to as a community of practice. The group may have monthly meetings to share new technologies, current challenges by site, and best practices. Several examples of how companies encourage information and expertise sharing include:

- Publishing technical specifications and best practices as a living set of guidelines
- Publishing a list of SMEs, by site, who are internal resources
- Developing a database of historical research studies and outcomes. This research history, which was previously stored in scientists' paper notebooks and process engineers' "tribal knowledge," is now accessible to scientists and engineers companywide in a searchable database. It is not uncommon for research from one product line to be applicable to other product lines within the same company.

Anticipate the Challenges

A challenge to the global approach is overcoming individual employees' perceived ownership of company expertise. While "siloing" of information is constraining, it also validates employees and managers with power and pride. Overcoming this ownership can take some persuasion, especially when company learnings have historically been kept at the local level.

There are two keys to successful and broad participation:

- Define and capture all current best practices and specifications.
- Engage site participation upfront to improve buy-in and acceptance of the best practices. Inclusion from the beginning reduces pushback and resistance.

Allow Flexibility for the Needs of the Business

The benefits of harmonizing across global sites are very powerful and compelling reasons to initiate such a program. However, it's important to recognize the risk of forcing standards when an alternative is needed. A good practice is to allow some flexibility and interpretation of any company's global standards for the needs of the business. For example, if using the standard technology adds burdensome costs or time to the process due to atypical regulatory requirements in one country, then the flexibility to deviate outside of the global standard should be allowed and accounted for. As always in drug production, good judgment needs to prevail in cases where there is an unusual business need.

Reference

1. Paul, Steven M.; Mytelka, Daniel S.; Dunwiddie, Christopher T.; Persinger, Charles C.; Munos, Bernard H.; Lindborg, Stacy R.; Schacht, Aaron L. (2010). "How to improve R&D productivity: The pharmaceutical industry's grand challenge." Nature Reviews Drug Discovery. doi:10.1038/nrd3078.

About the author

Jason Nisler is the Bioprocessing Application Specialist at CPC. With over 20 years of experience in the bioprocessing field, Jason has extensive involvement in the design and implementation of single-use technologies at many global biotech manufacturing facilities. Jason is an active member with BPSA and ISPE and holds a Bachelor of Sciences in Mechanical Engineering from the Villanova University. He can be reached at jason.nisler@cpcworldwide.com.

About CPC

CPC (Colder Products Company), the leader in single-use connection technology, offers a wide variety of bioprocessing connection solutions. Our innovative designs offer flexibility to easily combine multiple components and systems including process containers, tubing manifolds, transfer lines, bioreactors and other bioprocess equipment. Sterile fluid connections from CPC are available in a complete range of 1/8- up to 1-inch flow configurations.

CPC® A DOVER® COMPANY

Smart fluid handling to take you forward, faster.

cpcworldwide.com