

# Time to Hit Reset: Life Science Manufacturing Facility Design in a Post COVID-19 World

Patrick McKelvey, AIA, NCARB, Department Manager, Architecture  
DPS Group, Boston MA

## A NEW WAY OF PLANNING

As the world we live in today is looking to re-start the economy in an active COVID-19 state, how comfortable are we as individuals returning to our work environment? For the Life Science industry, this is extremely important considering the essential business aspect and maintaining business operation.

Common questions about immediate safety concerns could include: Has my co-worker been social distancing? How am I to perform my essential job while practicing social distancing? What strategies has the facility implemented to ensure social distancing and promote disinfecting while maintaining operational effectiveness?

At DPS, we are already considering how the Life Science industry can make adaptations to existing facilities and business practices through select design strategies and simple building retrofits to meet the challenges surrounding the spread of the COVID-19 virus through human interaction and potential bio-remanences left behind. We are also exploring potential design solutions for new projects and facilities as the post-COVID-19 world will need to consider these ideas for all future projects.

## ARCHITECTURE:

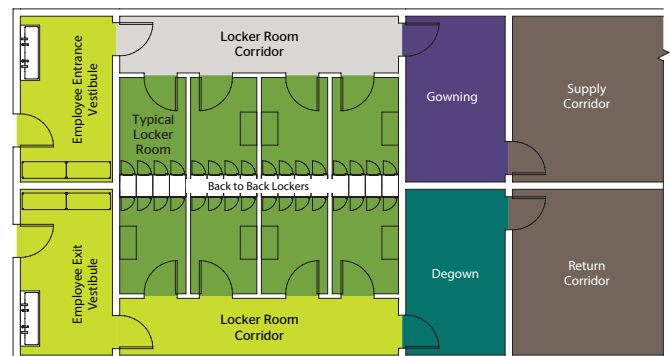
Whether considering retrofitting an existing facility or designing new; designs should consider minimizing exposure and risk to individuals maneuvering throughout the facility and performing work during the manufacturing process.

Accomplishing this could include the current COVID-19 protection strategy for individuals and bringing it forward into the workplace by designing quarantined-type bubbled areas designed not only to meet current process manufacturing requirements but to keep workers safe and isolated within the manufacturing environment.

Strategies to accomplish this would be to first consider optimizing employee pathways through a facility to where daily routines are performed. As an example, employee entrances that lead directly to a locker room would eliminate an individual potentially contaminating main reception areas, general office areas, amenities areas, and building connecting corridors.

**At DPS, we are already considering how the Life Science industry can make adaptations to existing facilities and business practices through select design strategies and simple building retrofits.**

Doorways along every travel path would have a fully automated operation to eliminate the human touch. Proximity fobs or voice command recognition and technologies would determine identification and allow access to secure areas. Locker rooms would be redesigned to eliminate large community changing areas and include individual back-to-back stalls with several back-to-back lockers segregating and isolating individuals. This approach would lead to easier disinfecting of smaller areas, and could be performed by individuals upon entering or leaving a stall.



*Proposed locker room design to eliminate potential viral contamination.*

Amenity areas such as canteens and coffee stations would become fully automated using hands-free technology for dispensing and faucet operation.

Building lighting would include either motion-sensing technologies or be automated through the building management system (BMS) for computerized on/off hours of operation.

Warehousing operations could include automated dispensing carousels to provide necessary manufacturing or building support parts.

Centralized dispensing hubs could be designed for automated closed piping distribution of media, buffers, and flammable materials to support process manufacturing needs, eliminating the need to maneuver, store, and manipulate distribution attachments in different locations.

## **INSTRUMENT AND CONTROLS:**

A key component to minimize human contact and spread of potential viral deposits throughout a facility can be accomplished by designing an automated building management system (BMS) that would be expanded beyond building mechanical, sprinkler, electrical, and security systems to include new automated operations for doors and building lighting

Automated BMS systems strategies would combine the use of today's technologies of voice command, facial recognition, proximity identification, motion sensors to operate facilities in a way to minimize the risk of potential human contamination and exposure while operating everyday building systems.

An automated management system (AMS) could be designed to potentially operate process manufacturing operations to reduce human manipulation of materials and equipment.

## **PROCESS MANUFACTURING:**

The latest approach to process manufacturing is single-use technology. Knowing that the COVID-19 virus is spread by humans and can live on surfaces for a time, reducing risk and exposure to individuals working within process manufacturing areas could include reducing the number of manipulation steps required to set up and run manufacturing equipment in both upstream and downstream suites.

A strategy for this could be realized by looking toward the past with closed-loop processing and expanded CIP systems that would minimize manufacturing setups and would reduce human manipulation and potential contamination of switching out single-use equipment parts.

Other strategies could include fully automating the manufacturing process including upstream and downstream manufacturing and continuous chromatography operations to reduce human interaction time within manufacturing spaces.

Manufacturing spaces could be designed to universally include VHP automatic systems ensuring decontamination daily or as needed.

A strategy to process manufacturing and isolation of individuals could include the elimination of large expansive ballroom configurations for smaller specific process suites designed for individual setup and operation but linked to specific process trains. This approach is designing a contained manufacturing assembly line where banks of small process suites are adjacent to each other and connected through closed-loop systems that form the complete process manufacturing train.

## **WHAT LIES AHEAD?**

Architecture and engineering design approaches will need to take into account minimizing human interaction in both building and manufacturing presence and incorporating new automated building technology and manufacturing systems to help reduce the spread of the COVID-19 virus and provide individuals with a level of comfort surrounding their safety and risk of exposure.

The work environment we once knew is no longer. When designing a new or retrofitting an existing Life Science facility, there is now the need to strategize on how to reduce the risk of viral exposure and increase employee safety through minimal exposure to others, while maintaining efficient and effective process manufacturing. This is now our new normal.