

DAPR ENGINEERING: BIOTECH CASE STUDY

SYSTEMS INTEGRATION AND AUTOMATION OF COVID-19 TESTING LAB

BACKGROUND

DAPR Engineering, a local engineering solution-provider with experience deploying fast-paced projects, was selected by a biotech company to join a multi-organizational team. The objective was to create a large-scale, mass-processing COVID-19 diagnostic testing lab. To set up this testing facility, DAPR Engineering created a fully integrated lab that combines discrete and independent automated lab workcells into a smart and connected solution. To support reopening strategies, the project required the lab's new automated diagnostic workflow to increase COVID-19 testing throughput and efficacy while reducing both costs and human workload.

CHALLENGES AND SOLUTIONS

- **Time to market.** Due to the urgent response necessary in combatting the COVID-19 pandemic, we expedited an 18-month project to completion in just 9 months. We leveraged our experienced and skilled team as well as our extensive supplier network to procure equipment while staying on time and on budget.
- **Introduction of industrial automation to laboratory environment.** Our device integration solutions created a unique factory-like environment in a laboratory setting. We developed multiple workcells that performed process specific applications. Within these workcells, we combined robots, automated and manual lab equipment, and auxiliary hardware, such as vision inspection systems. Together they performed each workcell's function. We then integrated a smart-conveyance system that automated the transport between the various workcells in the lab. The fully integrated solution reduced human labor, including handling, sorting, and distribution, while increasing throughput speeds, efficiency, and testing capacity.
- **Successful multi-organizational collaboration.** DAPR was integral in orchestrating the factory-like process flow around the central smart conveyance system by collecting input from other design firms as well as the customer's process. While each of the companies had different roles in the project, our engineering expertise was vital in developing and implementing design and build solutions to ensure the project's success.
- **Developing custom automated solution in parallel with the biology as the scientific process and testing requirements were in a constant state of evolution.** We conceptualized the lab layout and designed automated process flows as the scientists developed the testing process. To quickly adapt to the numerous process changes, we developed our solutions with flexibility and modularity in mind. We integrated the industrial automation with laboratory devices using the MagneMotion® intelligent conveyor system, because it offered the flexibility to rapidly change the pathway assembly to accommodate the numerous iterations and ever-changing process requirements.

SUCSESSES

DAPR Engineering combined sound engineering principles, innovative design approaches, solution-based processes, and effective project management as part of a collaborative team to deliver a high-throughput automated lab for the mass testing and processing of COVID-19 diagnostic testing.

PROJECT SUMMARY

Successful integration of industrial and lab automation to create a large-scale COVID-19 diagnostic testing lab.

Industry: Biotech/Pharmaceutical

Product: Automated and fully integrated life science lab

Location: Boston, MA

Timeframe:

- 9 months

Capabilities Utilized:

- Project Management
- Workflow Analysis
- Coordinated Equipment Procurement
- Requirements Analysis
- Concept Development
- Controls Design
- Full System Design and Integration
- Timing Studies
- Sensitivity Analysis
- Thermal Analysis
- Mechanical Analysis
- Motion Analysis
- Structural Analysis

Results:

- Effectively managed a complex multi-organizational project environment.
- Successfully implemented a scalable laboratory architecture to achieve a reproducible highly iterative testing process in an accelerated timeline.
- Successfully integrated industrial automation, automated laboratory devices, and a smart conveyance system into a comprehensive and continuous laboratory workflow.
- Achieved throughput goals while enhancing efficiency and traceability
- Provided IQ/OQ/PQ documentation.