APPRENTICE

THE RAPID ADOPTION OF **INTELLIGENT MANUFACTURING** AND **PHARMA 4.0** DURING COVID

OVERVIEW

The pandemic brought to light the immediate need for a better way to improve reliability, safety, scalability and speed to market. Gone are the days of using inefficient, cumbersome paper procedures and disconnected systems.

Today's complex manufacturing organizations are under great pressure to speed up processes while ensuring quality. The only way to meet today's demands is through the adoption of intelligent technology and remote collaboration platforms through which organizations can connect their people, processes and environments.

Through intelligent technology and Pharma 4.0 connected systems, organizations can connect, monitor and support teams in real-time; improve batch yield; manage resources; utilize guided workflow assistance; and gather, query and store the critical data needed to improve efficiency, reliability, compliance and speed.

Organizations lacking these systems not only face greater operational challenges during this ongoing COVID-19 pandemic, but experience greater downtime overall, higher deviations, less access to proper training and inefficient data processing, resulting in longer lead times, lower batch quality and higher costs.

In this e-book, you will learn how...

- Some of the world's leading life science organizations leverage Artificial Intelligence (AI), Augmented Reality (AR), and Pharma 4.0 principles to scale faster
- Life science organizations can easily leverage the content they already have to make deployment fast and easy
- Apprentice.io's intelligence software platform is used to help organizations scale faster—from COVID to cancer—and rapidly increase speed to market

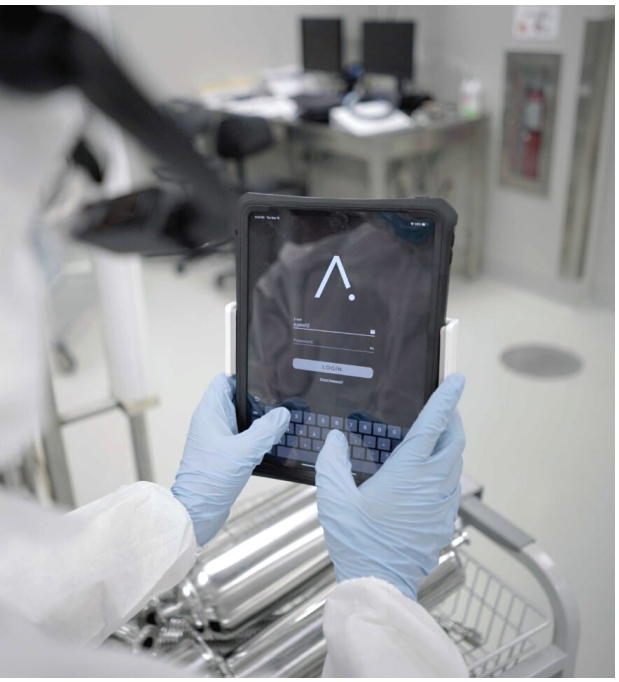
SCALING FASTER WITH AI, AR, AND PHARMA 4.0 PRINCIPLES

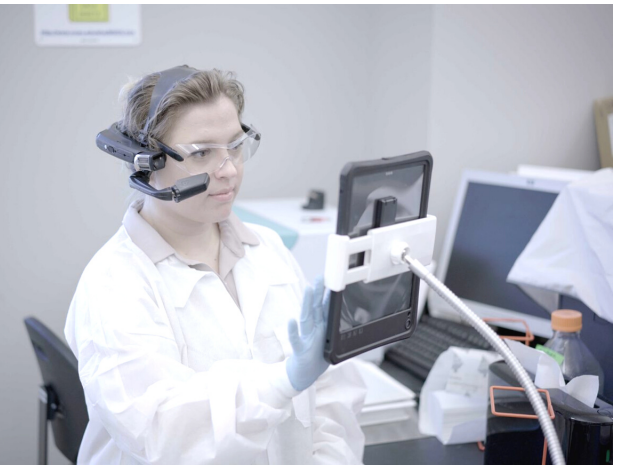
Biotech and biopharma companies can utilize new technologies like AR, AI, and Pharma 4.0 with Apprentice to get critical drugs to market.

These technologies provide software platforms that enable guided workflow execution, data collection, integrations with existing systems, and remote collaboration to optimize the execution of complex processes in regulated work environments.

The data collected in the Apprentice platform through the execution of processes may utilize augmented reality for the visualization of processes and metrics for real-time understanding of process controls. Artificial intelligence within the Apprentice platform is leveraged for trend monitoring, step/instruction simplification, and predictive maintenance to improve all aspects of the manufacturing process.

COMMON USE CASES





- Accurate Turnover
- AI Model Building
- Audit Readiness
- Auto Manage Inventory/Materials
- Barcode Scanning
- Batch Management
- CDMO/CRO Collaboration
- Daily Team Standup
- Data Monitoring
- ECP
- Electronic Batch Records
- Equipment/Device Tracking
- FAT-SAT Access
- Guided Remote Repair
- Hands-Free Guided Procedure Execution
- Intelligent Data Capture/Logging
- Lab/Suite Guidance
- Performed/Verifier Sign Off
- Record Tribal Knowledge
- Simulated Training
- Site Tours/Inspections
- SME/Vendor Support
- Tech Transfer
- Training

CASE STUDY #1

A biopharma client with a refrigerated biologic drug product required a platform to optimize line clearance and change over to provide media-rich instructions, reduce errors, increase speed and reliability, all while increasing the safety of the operators.

The Apprentice platform was used to provide audio, image, and video-based guided workflow instructions for each of the line clearance sites to inspect along the packaging line. The operators could use Apprentice devices to inspect their equipment, increasing their safety while they collected any remaining bottles, labels, and packaging inserts (that could potentially make their way into other lots or drug products during changeover).

The Apprentice platform collects the metrics from deviations and found materials during line clearance providing predictive data on where the collections of these materials are most likely to occur. This allows for new insights in building guards in some high-profile areas and when the packaging equipment required maintenance to reduce the number of found articles during line clearance and change over optimizing the process and increasing the speed to change-over leading to an increase in the number of packaging runs available on that line on a weekly basis.

CASE STUDY #2

In another representative use case, a biopharma client performed an integration with the Apprentice platform and their data logging collection platform with over 250,000 sensors reporting live data for all processes.

The Apprentice platform's guided execution workflows were able to take live sensor data from and insert the data collected by the relevant equipment as data points or data trends over a defined time period, confirm that the data from the equipment sensors was within the defined specifications, enter the data into the form fields, and provided clearance for the operator to continue with the execution of the process if results were within defined ranges.

The access to large data sets of live sensor data for process equipment with the Apprentice platform provided opportunities for insights into time-of-day trending, process cascades, and optimizing process flows within the network of facilities.

CASE STUDY #3

A pharmaceutical manufacturing client experienced a potential loss of critical time and materials due to a malfunctioning piece of equipment.

An SME using Apprentice was able to work remotely with the vendor to perform the repair immediately, without delay or having to worry about social distancing measures.

Through augmented reality tools and built-in language translations, the operator was easily able to make the repair. Using the same Apprentice features, this customer also routinely collaborated with offsite teams, suppliers and CMOs to ensure proper protocols were in place, solve problems quickly and operate hands-free.

LEVERAGING EXISTING CONTENT TO MAKE DEPLOYMENT FAST AND EASY

Through Apprentice, organizations can easily leverage the content they already have to make deployment fast and easy.

We utilize an organization's existing batch records, PDFs and SOPs and augment them with smart data, linked resources, rich media content and more. Operators can author content, collaborate with teams and sign off on procedures quickly.

With the appropriate content at their fingertips, users can access the information and workflow guidance they need while operating hands-free using Apprentice. These teams ultimately increase efficiency, limit deviations, train faster and create more accurate data records while gaining invaluable operator confidence.

WORKING WITH APPRENTICE

Using intelligent technology, AI, AR and Pharma 4.0 principles, Apprentice streamlines operations, and enables an organization to scale faster and increase speed to market.

Our suite of intelligent solutions – ranging from batch management to guided procedures, predictive resource management, event tracking/logging and remote collaboration/troubleshooting – offers organizations a connected, end-to-end approach to manufacturing that improves scalability and increased speed to market.

During the pandemic, our pharma-compliant TANDEM remote collaboration system was incredibly significant for pharma organizations in need of immediate solutions to help stabilize the supply chain, while offering real-time remote support and monitoring that connected teams with vendors, CMOs, suppliers and partners. As these complex organizations continued to realize that the future of intelligent manufacturing is now, we saw more rapid adoption of our intelligent MES system.

Through a connected system, organizations can manage operations more efficiently, provide operators with enhanced tools that improve execution and obtain high-level data that lends itself to better decision making.

Apprentice solutions are designed specifically for pharmaceutical manufacturing and trusted by the world's leading life science organizations.

Our system is more intelligent, flexible and easier to deploy than traditional manufacturing systems, making it the pharma industry's leading choice for MES, EBR and remote collaboration solutions.

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